THE IRON TRADE REVIEW

VOLUME XXX. CLEVELAND, O. JANUARY 21, 1897. CHICAGO, ILL. NUMBER

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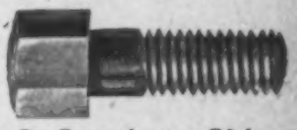

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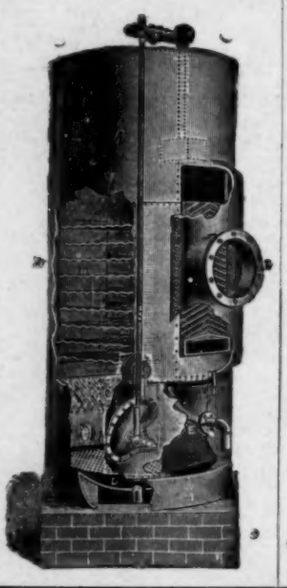

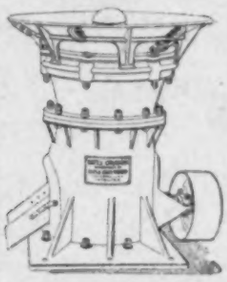

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THE IRON TRADE REVIEW

VOLUME XXX CLEVELAND, O. JANUARY 21, 1897 CHICAGO, ILL. NUMBER 3.

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Though the iron trade shows a subsidence of the commotion that has been more or less in evidence since the development of the Carnegie programme for the attainment of lower costs, it gives no indication as yet that is accepted as typical of the year's business. So far as billet mills are concerned, the first quarter's work is laid out for them in sales already made and others have contracts that will carry them two or three months further. In the Central West they are all busy to-day, albeit there is little if any profit in most of the contracts that have been taken. It develops that the total of billet tonnage placed is more than published reports of the past month or six weeks would indicate, many of the deals being closely kept at the time. While there are those whose prophecies are affected by to-day's conditions, the preponderance of informed opinion is strongly with the view that the second quarter of the year will bring activity of which there is now no hint. So many conditions of such a turn are met by the financial and trade situation, particularly as regards our relations to the outside world, that the general disposition to look to the future good rather than to present discouragement is not surprising. The most important contracts that has had attention from steel works in the week are the Southern Union Station, Boston, involving 7,000 tons, which went to the Pennsylvania Steel Co., and the Columbia, Pa., bridge's 8,000 tons, which Eastern works have secured. Drake & Sutton, Pittsburg, have the construction contract and most of the steel goes to Pennsylvania Steel Company. It is reported, but without confirmation, that 30,000 tons of rails for the Grand Trunk went to Chicago. At all events, the contract is not for early rolling, the Illinois Steel Co.'s rail mill at South Chicago having closed down in the week, with no time set for resuming. The wage reductions in the Chicago district have not set a pace and probably will not. One Mahoning Valley plant has followed the example, but that such a step is entirely at variance with the general expectation concerning 1897 is well recognized. Yet if American steel works are compelled to look to outer markets for the disposal of surplus tonnage so that the cost unit on products for home consumption may be kept at the lowest point through continuous operation, the question may come up whether labor will make concessions on contracts taken for export. If every form of combination to sustain prices is to be swept away in the iron trade, it would appear that the competitive struggle must affect wages ultimately. Southern pig iron exports are increased week by week, and while the amounts involved are still greatly exaggerated, they have been sufficient to enable the producers to hold their prices at home better than ever before under similar stress. The increase in pig iron production throughout the country is unwarranted by present conditions and points to low prices on foundry grades. Bessemer seems to have touched bottom. A 5,000-ton sale at $10.35 Pittsburg is reported but the average furnace quotation is $10 in the valley, prompt delivery. In billets activity has subsided. The market may be fairly quoted $15.50 to $16, Pittsburg, with mills adhering generally to the latter figure. Bar iron remains at 1.15c, Cleveland, by action of the meeting of the Merchant Bar Iron Association on Tuesday. All finished material not held up by combination is weaker, plates, angles and bars in particular.

THE CLEVELAND DISTRICT.

Pig Iron. The Bessemer iron market has been quiet in the week and quotations are nominal. With all the steel works that buy from valley furnaces in operation, the outlook is more hopeful from the standpoint of consumption; but wants were covered for some time ahead in the buying of the past four weeks, while a considerable tonnage was taken on speculative account. Speculative buyers who took iron in the week preceding election, when prices got nearly $2 a ton above some of the lowest lately reported, have had an uneasy time of late, and the chance of recouping on iron bought at present prices is not attractive. The latest sale of Bessemer reported from Pittsburg was at $10.35, Pittsburg delivery, and it is stated that more iron can be had at this figure. The report that the Ohio Steel Co. will build open-hearth furnaces is confirmed by that company. It is expected that the first furnaces will be in operation in the next four months. This will furnish a demand for basic iron, which, with other basic plant building, will be more of a factor in valley furnace calculations. Foundry iron is only moving in small lots, at the prices quoted below. Forge has shaded $9 in the valley. We note a sale of 2,500 tons of spiegel in the Cleveland district.

Bessemer	$10 50@10 75	Valley Scotch No. 1	$11 65
No. 1 Strong Foundry	11 40@11 65	Valley Scotch No. 2	11 15
No. 2 Strong Foundry	10 90@11 15	Gray Forge	9 65@9 90
No. 3 Foundry	10 40@10 65	Lake Superior Charcoal	13 50

Billets. Most Cleveland buyers of billets and sheet and tin-plate bars are well supplied at low prices for from three to six months ahead. It has been intimated by others that some steel would be taken now at $16 Cleveland, but that is below current mill quotations. It is believed the next meeting of the billet pool will be for the final closing up of its affairs and its formal dissolution. This may occur in the latter part of the month.

Finished Material. The decision of the Merchant Bar Iron Association at its meeting in Cleveland, Tuesday, to maintain the 1.15c Cleveland basis reflects the opinion of producers that at current prices for scrap and Southern forge iron there is no money in the business at lower prices, and that demand is not to be stimulated by reductions. There is little business going in any line, and two Ohio railroad receiverships are not encouraging, especially in view of the fact that on their 1897 ore business, roads running from the lakes must make lower freights. We quote: Beams and channels, 1.65c; steel bars, 1.10c; bar iron, 1.15c; tank plates, 1.15c to 1.20c; angles, 1.15c; No. 27 black sheets, 2.05c to 2.10c.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1142 MONADNOCK BLOCK, Jan. 20.

While actual transactions have been but very little larger than they were a week ago, the general tone of the market is much better than it was at that time and both dealers and consumers appear to have had an accession of confidence since our last report. Buyers have been taking small lots of material much more freely than has been the case for the past several weeks, and although no new large contracts have been placed, orders for delivery of material on old contracts have been satisfactorily large and appear to be improving all the time. It is not expected that sales will be very much larger between now and the first of next month, but it is thought thatthe tonnage for February will be considerably in excess of that for either December or January.

PIG IRON.—Only one order of any consequence was placed last week, that calling for 1,000 tons of Southern iron. Carload business has been considerably better than it was the first two weeks of the year, and the demand indicates a continuous improvement. One or two buyers have asked for prices on round lots, but so far have not placed their orders. Prices of Northern iron are maintained very firmly on the business that is going, and it would take a comparatively large order with very favorable terms as to shipments and payments to secure any considerable reduction in quotations. Prices of Southern iron appear to be weak and in one or two instances quotations have been made quite a little under the figures we give. It would not take a remarkably large tonnage of orders to make the market very perceptibly firmer than it is at present, and if the looked for business comes next month it is not likely that quotations will be any lower than those that are ruling at present. We reduce our quotations on Southern iron to more nearly represent the actual condition of the market.

Lake Sup. Charcoal	$13 50@14 00	Southern No. 2 Soft	$10 65@11 90
Local Coke Fdy. No. 1	11 75@12 25	South'n Silveries No. 1	12 15@12 65
Local Coke Fdy. No. 2	11 25@11 75	South'n Silveries No. 2	11 65@12 15
Local Coke Fdy. No. 3	11 00@11 25	Jackson Co. Silveries	14 00@16 05
Local Scotch Fdy. No. 1	11 75@12 25	Ohio Silveries No. 1	15 00@15 55
Local Scotch Fdy. No. 2	11 25@11 75	Ohio Silveries No. 2	14 50@15 05
Local Scotch Fdy. No. 3	11 00@11 25	Ohio Strong Softeners	14 00@14 28
South'n Coke No. 1	11 40@11 65	Alabama Car Wheel	16 65@17 15
South'n Coke No. 2	10 90@11 15	Malleable Bessemer	12 75@13 50
South'n Coke No. 3	10 65@10 90	Coke Bessemer	13 00@13 50
Southern No. 1 Soft	11 15@11 40		

BAR IRON.—There is quite a little better inquiry than has been seen for several weeks past, but nearly all of it is for small lots. It is hoped that these are forerunners of the larger business that will come with generally better conditions. Quotations are made as follows: Common iron, 1.25c to 1.30c; soft steel bars from strictly billet stock, 1.20c to 1.30c.

RAILS AND TRACK SUPPLIES.—While the local mills have not secured as large a tonnage so far as they had at the same time last year, orders have been very fair and the prospects for the future are excellent. It is reported that Grand Trunk has placed 30,000 tons of rails within the last week, but it was impossible to secure confirmation of this. Prices are made: Rails, $26; splice bars, 1.40c to 1.45c; track bolts with square nuts, 1.95c to 2c; hexagon nuts, 2.05c to 2.10c; spikes, 1.65c to 1.75c.

BILLETS AND RODS.—Nothing new has come up in this branch of the market, and while a few small orders have been taken no large ones are reported. Rods are quoted at $23, Chicago.

STRUCTURAL MATERIAL.—So far as new business is concerned the market has been very flat and sales have been limited to small orders. Shipments upon old contracts continue to be very satisfactory to the mills. Quotations are as follows: Beams and channels, 1.73c to 1.80c; angles, 1.25c to 1.30c; plates, 1.25c to 1.30c; tees, 1.50c to 1.55c. Small lots from stock are quoted ¼c to ½c higher.

PLATES.—A very fair business has been done in small lots and the prospects are good for a continuance and an increase of orders Prices are made as follows: Tank steel, 1.25c to 1.30c; flange steel, 1.45c to 1.55c; fire-box, 2c to 5c.

SHEETS.—The demand was considerably better last week and while sales are limited to small lots dealers are feeling quite a little encouraged over the prospects for the future. Quotations are unchanged at 2.20c to 2.25c, for No. 27 black and 80 to 80 2½ per cent discount for galvanized.

MERCHANT STEEL.—While no large contracts were placed last week and none are in sight for the immediate future, general business both from mill and from store is very much improved and order for small lots are quite a good deal more frequent than they were a week or two ago. Prices are as follows: Open-hearth spring, tire and machinery steel, 1.85c to 1.95c; smooth finished machinery steel, 1.60c to 1.65c; smooth finished tire, 1.55c to 1.65c; tool steel, 5.50c to 7.50c: specials, 11c and upwards.

OLD MATERIAL.—The only sale of consequence last week was one of several hundred tons of old wheels, which went at $11. An offer was made to the purchaser of this lot of another round lot at the same price but was refused. One of the Western roads asked for bids on two lots of old rails, neither of them for delivery in Chicago, and of these only one was sold, for delivery in Colorado. Miscellaneous scrap iron is quiet and only a few small sales were made last week. Quotations are made at $12.50 and $13 for old iron rails; $9.50 to $10 for old steel rails, and $11 for old wheels. Miscellaneous scrap is quoted about as follows: Railroad forge, $11 to $11.50; dealer's forge, $9.50 to $10; No. 1 mill, $7 to $7.50; heavy cast, $7 to $7.25; malleable cast, $8 to $8.50; axles, $14.25; cast borings, $3; wrought turnings, $4.50; axle turnings, $5.50 to $6; mixed steel, $7; stove plates, $5.50; heavy melting steel, $9.00 to $9.25.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
807 TRADESMEN'S BUILDING, Jan. 20.

The record of the week under review has been far from encouraging to the local interests, expecting better things of 1897 than were realized in 1896. Much of the feverish tendency noted of late in Bessemer and billets has disappeared, but the situation otherwise is little improved. Extremely low prices prevail in the entire finished market and the volume of orders is not sufficient to occupy mills. This week, it is stated, will determine definitely the outcome of the efforts to resuscitate the billet pool. The confidence in better business is apparently not shaken by its tardiness and predictions are still plentiful of an early change for the better.

PIG IRON.—Rumors of transactions in Bessemer have about subsided and the iron sold during the week, at whatever price, is of small proportions. Little interest is shown by probable buyers, save the sort of interest apparent since the first of the year regarding the possibilities of cheap iron. Extremes in prices continue to be reported by parties whose interest prompt to one or the other view of the market, and there is no little uncertainty as to actual prices. Offers of $10.50 and $10.65, Pittsburg, are said to have been refused by furnacemen; while, on the contrary, the general belief is that the market is not above the latter figure, nor could that figure be secured at present for large lots. While the symptoms of uneasiness have largely subsided the situation can scarcely be said to have improved, and the local feeling in Bessemer is extremely weak. Foundry irons do not share this weakness in price but are entirely lifeless. A sale of 300 tons of No. 1 is reported at $11.75, Pittsburg. Gray forge is firmer at $9.65 to $9.75. We quote:

Bessemer	$10.60 to $10.75
No. 1 Foundry	11.50 to 11.75
No. 2 Foundry	11.00 to 11.25
No. 3 Foundry	10 50 to 10.75
Gray Forge	9.65 to 9.75

BILLETS.—The present week, it is stated, will determine the future of the pool, and unless unlooked-for contingencies arise it is believed its continued existence in any form is unlikely. The situation, meanwhile, is not favorable to higher prices. Wants have been largely covered, and offers of steel below $15.25, Pittsburg, meet with no responses. Aside from a lot of 5,000 tons sold close to $15.50, no sales of any consequence can be traced. Local mills hold nominally for $16, but shade that figure materially without hesitation.

STRUCTURAL MATERIAL.—The Columbia Bridge contract is at this writing held in abeyance, although bids were opened last Saturday. The only other contract of any size is the 4,000 tons of structural shapes required in the Union Railroad Terminal at Boston, which will be let this week. It would seem that considerable new business will be required to better existing prices which are very low. Angles and universal plates are openly quoted at 1.10c, and this is shaded frequently. Beams are easily maintained at 1.55c Other quotations follow: Zees, 1.35c to 1.40c; tees, 1.30c to 1.35c.

BARS.—The open quotation of 1c per lb. on steel bars is said to have been made of late, and as previously reported

even this figure is shaded. From the slight increase in business noted about Jan. 1, the market has dropped off again and not for many weeks has the present one been equaled in dullness. Bar iron also is lifeless. Muck bar at $19 to $19.50 is in no demand.

PLATES.—The dullness in plates is pronounced and no new business is reported. Prices are weak: Tank, 1.10c to 1.15c; shell, 1.25c to 1.30c; flange, 1.35c to 1.40c.

PIPE AND SKELP.—Little demand for pipe is current and the business closed is largely merchant trade. Prices are unchanged, five 10's being held on small lots and five 10's and 5 per cent on carload lots. Steel is held at six 10's. On skelp we continue to quote: Grooved steel skelp, 1c to 1.02½c; sheared, 1.10c to 1.15c; grooved iron skelp, 1.17½c to 1.20c; sheared iron skelp, 1.30c to 1.35c.

SHEETS.—The livelier condition noted of late in sheets is no longer apparent and prices are reported lower. We quote: No. 26, 1.90c to 1.95c; No. 27, 2c to 2.05c; No. 28, 2.10c to 2.15c. Galvanized sheets show no change for the better and are very weak being quoted at 80 and 5 per cent off list.

MERCHANT STEEL.—Eastern requirements for merchant steel are reported as somewhat heavier than last week. Plow steel has been required by agricultural manufacturers and contracts have been taken covering these wants. Prices are unchanged, and are quoted: Soft steel bars, 1.20c; machine straightened tire, 1.35c to 1.45c; spring, 1.30c to 1.35c; open hearth spring, 1.55c to 1.60c; machinery, 1.30c to 1.35c; toe chalks, 1.55c to 1.60c; sleigh shoe, 1.45c to 1.50c.

OLD MATERIAL.—There is no inclination to increase present stocks while prospects are so forbidding, and on the contrary stocks will not be sacrificed at any approach to present offers. At forced sale scrap of any description would not bring the appended prices, but dealers are holding at about these figures: Wrought scrap, $11; cast scrap, $10 to $10.25; car wheels, $11.50, gross; old steel rails, $13 to $13.25; coil spring, $10.75 to $11, gross; hammered iron axles, $16 to $16.50, net; rolled iron axles, $14 to $14.50; heavy melting stock, $12.50 to $13; machinery cast, $9.75 to $10.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Cincinnati. The slight improvement observed a week ago in the pig iron market has expanded somewhat. Inquiries are more numerous and orders for carloads and small lots have increased, while there have been some fair sized orders booked. Prices are irregular. The larger Southern producers have held quite firmly for their figures, but there is a disposition by some sellers to make concessions for any business offering. Some close observers think the indications are more favorable, but this tendency is not decided enough to be generally acknowledged. The pig iron exports from Birmingham have been a factor of some importance in view of the lagging of home demand, and have helped to prevent greater weakness in Southern iron. The mills hereabouts are dull, with no immediate prospect of improvement. Old material finds no market. No. 1 railroad wrought scrap is quoted $10 and cast scrap $7. We quote the pig iron market as follows: Southern coke, No. 1 foundry, $10.50 to $10.75; No. 2, $10 to $10.25; No. 3, $9.50 to $9.75; gray forge, $9.25 to $9.50; mottled, $9.25 to $9.50; No. 1 soft, $10.25 to $10.50; No. 2, $9.75 to $10; Hanging Rock charcoal, No. 1, $15 to $16; Tennessee charcoal, No. 1, $13 to $14; Jackson Co. silvery, No. 1, $13.50 to $14; Standard Alabama oar wheel, $14.75 to $15.50; Tennessee car wheel, $13.50 to $14.50; Lake Superior car wheel and malleable, $14.75 to $15.25.

Philadelphia The feature of the market continues to be the low quotations of certain mills in the effort to secure business that will tide over the gap. In pig iron a few lots of fair size have been taken at the prices prevalent in the preceding two weeks. Standard brands of Pennsylvania irons are quoted at $12.75 to $13.25 for No. 1 X and at $11.75 to $12.25 for No. 2X; Alabama and Virginia irons at $11.75 for No. 1 and $11.25 for No. 2. Mill irons are quoted $11 to $11.25 for standard and $10.75 for ordinary. In steel billets somewhat more inquiry is noted this week and quotations are from $17.75 to $18, with $17.50 reported to be possible. Some business is doing in finished lines. The Columbia bridge, involving 8,000 tons of material, is to be awarded this week, bids having been opened, and it is believed the business will be taken by local mills, though Pittsburg has been a sharp competitor. For plates and angles prices are weaker and in the struggle for the business referred to it is believed these materials will go at a figure close to 1.10c. The shapes will of course bring the average up materially. On small lot business quotations are 1.25c to 1.30c on plates and angles. Beams and channels up to 15 inches are quoted 1.70c to 1.80c. Bars, steel and iron, are quoted 1.15c to 1.20c, though 1.10c is reported in connection with some sales of iron. Holders of old material are quoting lower prices, but a 50-cent reduction does not seem to prompt investment. No. 1 wrought scrap is quoted $12 and choice railroad scrap $13; heavy steel scrap, $11.50; old iron rails, $14.50; old steel rails, $12; wrought turnings, $8; axle turnings, $8.50; cast borings, $7.

Second National Convention of Manufacturers.

Already 250 members have signified their intention of attending the second annual convention of the National Association of Manufacturers, to be held at Philadelphia, Jan. 26, 27 and 28, and many more are expected. The large membership of the association, the importance of the many matters which will be considered by the convention, and the extensive arrangements for the entertainment of visitors which have been made by the people of Philadelphia, promise to make this one of the most notable gatherings of American manufacturers that has ever taken place. The Association has a membership of about 800 of the most prominent manufacturers in the United States, representing a wide range of industries.

The business sessions will be held in the new Horticultural Hall, on Bond street, below Locust, and the headquarters of the association during the convention will be in the Hotel Walton, directly opposite the place of meeting.

The programme provides for business sessions, morning and afternoon, on each of the three days. The convention will be called to order at 9.30 o'clock Tuesday morning, Jan. 26, and formal business will begin with the presentation of the annual report of the president. This will deal in detail with the work which the association has accomplished during the past year, and will offer suggestions for future operations. Afterwards will come the reports of the other officers and various committees which have been engaged upon different lines of work, and then the business of the convention will be the consideration of the reports.

On Wednesday evening it is proposed to hold a session devoted particularly to the extension of foreign trade of the United States, and there will be brief practical talks by members who have recently made personal study of foreign trade conditions, and the methods by which this trade can be developed to the best advantage. This session will be full of interest to all who are concerned in any way in foreign trade. The sessions of Thursday morning and afternoon will dispose of the remaining business, and the convention will come to an end with a banquet on Thursday evening. Covers will be laid for upwards of 500. The banquet will be tendered to the visiting members and invited guests by the Philadelphia members of the National Association of Manufacturers.

PAPERS recording the transfer to the Pittsburg, Bessemer & Lake Erie of the Pittsburg, Shenango & Lake Erie Railroad and the Butler & Pittsburg Railroad, were filed with the Secretary of State at Harrisburg on Monday. The consolidation is for a period of 999 years, dating from the time of filing papers. The capital stock of $6,000,000 is divided as follows: Pittsburg, Shenango & Lake Erie, $4,800,000; Butler & Pittsburg, $1,200,000.

FIRE did $30,000 damage to the plant of the New Castle Tin Plate Co. on Monday last. It is supposed to have originated from friction of transmission ropes. Five sets of rolls were rendered useless, and it will require three weeks to put the plant in running order.

THE Pittsburg Foundrymen's Association will hold its regular meeting on Monday evening, Jan. 25, at the Builders' Exchange. The paper of the evening will be read by Thomas D. West, on "Regulation of Foundry Mixtures."

THE IRON TRADE REVIEW

DEVOTED TO IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES.

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JANUARY 21, 1897.

AN ENCOURAGING VIEW AHEAD.

The existence of so many conditions favorable to larger industrial activity, and at the same time an unsatisfactory present state of things in all manufacturing lines, has been uppermost in the thoughts and talk of the business world for the past two months. The daily newspapers printed columns of prosperity dispatches immediately after the election and, in spite of all the cautions of informed and conservative men, they were accepted in some quarters as proof that prosperity had set in. It is not necessary here to dwell on the fact pointed out over and over again in the past few weeks, that the saving of the country from a great threatened calamity could not bear at once all the fruit that many seemed to expect. A sick man on the road to recovery from a tedious disease is exposed for an instant to a new danger—to death by violence, let us say. He is snatched from his peril by friendly hands, but recovery from the disease does not come in that act of rescue. The impatient people, who are disturbed by failures of banks and of business firms in the past few weeks, need to remember that bad business methods have brought failures in prosperous times, as in seasons of depression; and further, that not a single factor in the November result has become operative save that of restored confidence.

An interesting comment on the possibilities of the year that is before us is found on another page in the article reproduced from the New York *Evening Post*. The analogies between the situation today and that in the opening months of 1879 are worth dwelling upon at a time when some are disposed to take counsel of present distresses. It is true that 17 years of development have brought conditions that make a repetition of some of the features of the boom of 1879 impossible. There is no such building of railroads ahead, for one thing. And should the demand come, in iron and steel, it will not call on the mills and furnaces of Great Britain to supply it, as did that of 1879. Indeed, all the preparations now making on this side are for an opposite movement; and even though business should develop in the second or third quarter of the year, as many expect, there is still a probability of more or less steady export movement of iron and steel products, in view of the enormous capacity that has been built up in the midst of the depression of the past three years.

The greatest and most significant factor in the situation to-day is the immense balance of trade in favor of the United States on the business of 1896. This will appear in a glance at these figures from the Treasury Department's statistics:

Merchandise	1896.	1895.	Changes.
Exports	$1,005,878,417	$824,860,136	Inc. $181,018,281
Imports	680,556,233	801,669,347	Dec. 121,113,114
Excess exports	$325,322,184	$23,190,789	Inc. $302,131,395

This is an extraordinary showing. The exports are the largest on record, exceeding those of 1891, which previously were the largest, by $35,000,000. The imports have been smaller in only two other years out of ten. The gold statement is also strongly significant. As against net exports of $70,571,010 of gold in 1895, there were net imports last year of $47,777,097, a change of $118,348,107 from the preceding year. Present indications are, moreover, that this favorable balance will be maintained in the coming year. We have learned in the forced economies of recent years to do without much that had been imported from abroad; and on the other hand the demand for our cereals will keep up for some months, and with the grain will go many of our manufactures which we have educated foreign buyers to take from us in the years of slack demand at home.

With a restoration of financial strength, the imposition of adequate duties on the few lines of our products now insufficiently protected, and the bringing back of the benefits of reciprocal trade arrangements, there should be no doubt of the strong movement that will set in toward a prosperity basis.

The iron and steel import statement for November shows a sharp falling off from the total for November, 1895. The tin plate total for the 11 months is but little more than half that for the like period in 1895, and for the month about one-third that for November, 1895. Pig iron shows a more marked falling off:

IRON AND STEEL IMPORTS TO UNITED STATES.—GROSS TONS.

	November.		Jan.—Nov.	
	1895.	1896.	1895.	1896.
Pig iron	10,794	1,164	41,462	55,302
Scrap iron and steel	1,362	361	4,995	7,934
Bar iron	3,091	1,088	17,102	15,264
Iron and steel rails	2	.....	1,473	7,796
Hoops and bands	14	1	15	26
Ingots, blooms, etc	3,679	661	20,761	29,410
Sheets and plates	1,113	218	13,625	6,245
Cotton ties	11	50	3,486	7,146
Tin plates	16,730	5,797	305,940	113,496
Wire rods	3,745	1,025	24,455	17,344
Wire, etc	236	220	5,413	3,454
	40,767	10,585	338,677	263,417

Machinery exports from the United States to the United Kingdom, Germany, France and "Other Europe" were 150 per cent more in the 11 months

ending Nov. 30, 1896, than in the corresponding 11 months of 1895. The total value of machinery sent to the countries named was $9,987,247 to Nov. 30 last year, against 4,047,285 to Nov. 30, in 1895. To the United Kingdom the gain was 100 per cent and to Europe outside of Germany and France, 350 per cent, or from $872,821 to $3,615,213.

LAKE SUPERIOR IRON MINES.

In the Supplement accompanying this issue are given the annual tables of Lake Superior iron ore shipments from the beginning. The complete returns from mines producing in 1896 gives a total of 9,934,828, and this brings the grand total from the region in 42 years up to 107,618,540 gross tons, nine figures being now required. Two small outputs for 1896 are added to the list of last week—587 tons from the Boston mine and 2,297 tons from the Humboldt. By the courtesy of Dr. Nelson P. Hurst, of the Pewabic Co., we are enabled to make some additions to Menominee range production in years prior to the gathering of the statistics by this paper. So far as we know they have not been included before in any statistics of the region. They are 17,430 tons produced by the Breen mine in 1880 and years just preceding; 42,672 tons by the Cornell, in 1881 and years previous and 66,655 tons by the Emmett in 1881 and preceding years. All are on the Menominee range.

At the recent annual meeting of the Chapin Mining Co., P. L. Kimberly, of Sharon, Pa., was made a director representing the Hamilton and Ludington interests which were taken over by the Chapin Mining Co. a year ago.

The old board of directors was re-elected at the annual meeting of the Republic Iron Co., Jan. 20. A dividend of 50 cents a share was declared, payable Jan. 31. In its last fiscal year the company paid three dividends of $1 each. Sales of stock were made in the year at $18 and $19.

Arrangements have been made by which Oglebay, Norton & Co. will have the sale the coming year of a portion of the output of the Queen Iron Mining Co.'s properties at Negaunee—the well known Buffalo group. Corrigan, McKinney & Co. control the mines.

The Minnesota Ore Co., which has handled the product of the Hale and Cincinnati mines, on the Mesabi range, is succeeded by Drake, Bates & Co. Mr. F. A. Bates, who has had the sale of these ores from the beginning, has as his associates in the new firm, M. M. Drake, of Buffalo, superintendent of the Lackawanna Transportation Co., and president of the Bank of Niagara, and J. H. Bartow, of Cleveland. Both are interested in vessel property, which will have the carrying of the firm's ores. The sale of other ores than those mentioned is also being arranged for. Both the Hale and the Cincinnati have been increasing their output of late, the former producing 70,006 tons last year and the latter 57,324 tons. The Cincinnati, which is a Bessemer property, has been making an excellent showing in the quality of its product.

The House of Representatives of Minnesota on Jan. 14 adopted a resolution for an investigation of the title to the Mountain Iron mine recently leased by the Lake Superior Consolidated Iron Mines to the Carnegie-Oliver interest. The State Auditor, in his last report, held that the title was in the State. The lands on which the Mountain Iron is located were selected by the State in 1883 for its school fund, in lieu of regular school lands diverted to other purposes. In 1888 the Merritts secured a relinquishment of the Mountain Iron tract by the State and other lands were taken in their place. Then the Merritts took the Mountain Iron site under the general laws. It is now claimed that this relinquishment was made without legal warrant and that the Governor alone is entitled to make such transfer.

The strike started at the Aragon mine on the Menominee range four weeks ago is still in progress. The pumps have been operated steadily, to keep the mine free from water, but there is now talk of pulling them. The mining company, in which Angus Smith, of Milwaukee, is the chief holder, claims that with present conditions and the cost of mining the ore, it cannot stand an increase in wages. Reports are current, and believed to have some foundation, that the mine is to be sold.

CONDITION OF BLAST FURNACES OF U. S.*

Jan. 1, 1897.

Location of Furnaces.	Coke and Anthracite.					Charcoal.				
	Total No. of Stacks.	In Blast.		Out of Blast.		Total No. of Stacks.	In Blast.		Out of Blast.	
		Number.	Weekly capacity.	Number.	Weekly capacity.		Number.	Weekly capacity.	Number.	Weekly capacity.
New York	20	4	5860	16	9652	5	0	0	5	552
New Jersey	8	2	1390	6	2667	.....	.....	.....	.....	.....
Spiegel	3	1	171	2	68	.....	.....	.....	.....	.....
Pennsylvania:						13	1	60	12	685
Lehigh Valley	37	12	7192	25	10257	.....	.....	.....	.....	.....
Spiegel	1	0	0	1	70	.....	.....	.....	.....	.....
Schuylkill Valley	24	8	5523	16	7577	.....	.....	.....	.....	.....
Upper Susqu. Val	8	2	1451	6	2398	.....	.....	.....	.....	.....
Lower Susqu. Val	9	3	1216	6	3252	.....	.....	.....	.....	.....
Spiegel	1	0	0	1	500	.....	.....	.....	.....	.....
Lebanon Valley	13	4	2542	9	5357	.....	.....	.....	.....	.....
Pittsburgh	27	22	46735	5	8050	.....	.....	.....	.....	.....
Spiegel	1	1	614	0	0	.....	.....	.....	.....	.....
Shenango Valley	16	5	6882	11	10861	.....	.....	.....	.....	.....
Jun. and Con. Vals	14	4	4013	10	5185	.....	.....	.....	.....	.....
Spiegel	1	1	558	0	0	.....	.....	.....	.....	.....
Youghiogheny Val	3	0	0	3	2850	.....	.....	.....	.....	.....
Miscellaneous	4	2	1487	2	1204	.....	.....	.....	.....	.....
Maryland	5	0	0	5	7330	4	1	132	3	358
Wheeling District	10	3	3875	7	6791	.....	.....	.....	.....	.....
Ohio:						9	3	187	6	635
Mahoning Valley	11	8	11064	3	2730	.....	.....	.....	.....	.....
Central & Northern	10	6	7198	4	4143	.....	.....	.....	.....	.....
Hocking Valley	12	1	891	11	4295	.....	.....	.....	.....	.....
Hanging Rock	12	5	1514	7	2913	.....	.....	.....	.....	.....
Indiana	2	0	0	2	408	.....	.....	.....	.....	.....
Illinois	15	7	14071	8	16730	.....	.....	.....	.....	.....
Spiegel	1	0	0	1	1000	.....	.....	.....	.....	.....
Minnesota	1	0	0	1	629	.....	.....	.....	.....	.....
Wisconsin	4	1	601	3	3081	2	1	883	1	306
Missouri	3	0	0	3	1935	1	0	0	1	340
Colorado	3	0	0	3	4620	.....	.....	.....	.....	.....
Virginia	24	10	7149	14	7167	4	1	45	3	392
Kentucky	6	3	1040	3	2400	3	0	0	3	200
Alabama	39	15	17260	24	15212	12	1	267	11	2594
Michigan	.....	.....	.....	.....	.....	16	7	3023	9	3833
Tennessee	13	5	4054	8	4580	9	1	321	8	2310
Georgia	2	0	0	2	900	3	1	275	2	360
North Carolina	2	0	0	2	600	.....	.....	.....	.....	.....
New England	.....	.....	.....	.....	.....	11	1	63	10	975
Texas	.....	.....	.....	.....	.....	4	1	200	3	810
Washington	.....	.....	.....	.....	.....	1	0	0	1	175
Oregon	.....	.....	.....	.....	.....	1	0	0	1	275
Totals	365	135	154264	230	157442	98	19	5456	79	14800

SUMMARY.

Fuel.	In Blast.						Out of Blast.			
	Number.			Weekly Capacity.			Number.		Weekly Capacity.	
		Month Previous.	Year Previous.		Month Previous.	Year Previous.		Month Previous.		Month Previous.
Charcoal	19	19	23	5,456	5,182	5,224	79	79	14,800	14,913
Coke and Anthracite	135	128	218	154,264	137,096	202,257	230	238	157,442	154,992
Total	154	147	241	159,720	142,278	207,481	309	317	172,242	169,905

*The above table is condensed from the *Iron Age*. The tables of the *American Manufacturer* show in blast Jan. 1, 160 furnaces, with 163,576 tons weekly capacity instead of 159 720 as above.

New Carnegie Steel Co. Vice Presidents.

At a meeting of the board of managers of the Carnegie Steel Co., Ltd., held on Tuesday, Jan. 19, Alex. R. Peacock was elected vice president and general sales agent and Chas. M. Schwab vice president and general superintendent. These elections give a vice president in each department, financial, sales and mechanical, Mr. L. C. Phipps being vice president and treasurer.

THE report that Andrew Carnegie, H. C. Frick, and other officers of the Pittsburg, Bessemer & Lake Erie Road, have been negotiating with the Hays estate for 1,300 acres of coal in the first and second pools, with a view to securing return tonnage for the trains that are to carry ore from Conneaut to Homestead, is denied. No such transaction is under consideration, it is said, and in the same connection it is pointed out that the New York & Cleveland Gas Coal Co.'s properties in which Andrew Carnegie and Mrs. Thos. Carnegie are largely interested, are on the new line and will furnish coal for the back haul.

SAND-CORE-MOLDING MACHINE.

A machine for molding cores has been designed by Thomas J. Ryan, of 50 Congress street, Buffalo. While, as illustrated, the machine is adapted to the making of radiator cores, it will make any core that is produced in two half boxes, as for car bumpers, oil boxes and valves. The core shapes or pans now used by the different radiator concerns may be employed with the machine shown. These shapes are placed on the top slide table and are propelled forward by a reciprocating connecting rod on either side. The core box that is under the sand feeding device is riddled full of sand and then passes under the leveling brush to be leveled off. Thence it goes under the vent press, where the sand is pressed down evenly into the core box. The vents are pressed and punched in with the same revolution, and are then slid under the flour box, and every alternate core is sprinkled with flour. Then the two half-cores are put together in book form; one core shape is taken off, while the core and remaining dryer are placed in the oven. The empty shape is placed on the lower slide table, and is conveyed to the forward end of the machine, where it is ready to be used again, and so on.

Of the cuts given, Fig. 1 is a side elevation of the machine, Fig. 2 is a top plan view, and Fig. 3 is a vertical longitudinal view in section. The upper and lower slide tables 3 and 4 are arranged one above the other, extending the entire length of the machine and projecting beyond the ends of the frame sides so as to be within easy reach of the attendants at opposite ends of the machine. The rotation of the gear-wheels 31 moves the wrist-pin blocks 29 up and down within the vertical slots of the yokes 27, and imparts a reciprocating movement to the propelling-rods 25, and in turn to the oppositely located connected rod-shafts 12. The reciprocation of the propelling-rods 25 provides for a reciprocation of the adjustable hook-plates 20, carried by each of the shafts, thereby providing means for sliding the entire series of core-box sections 22 on the slide-tables toward one end of each table.

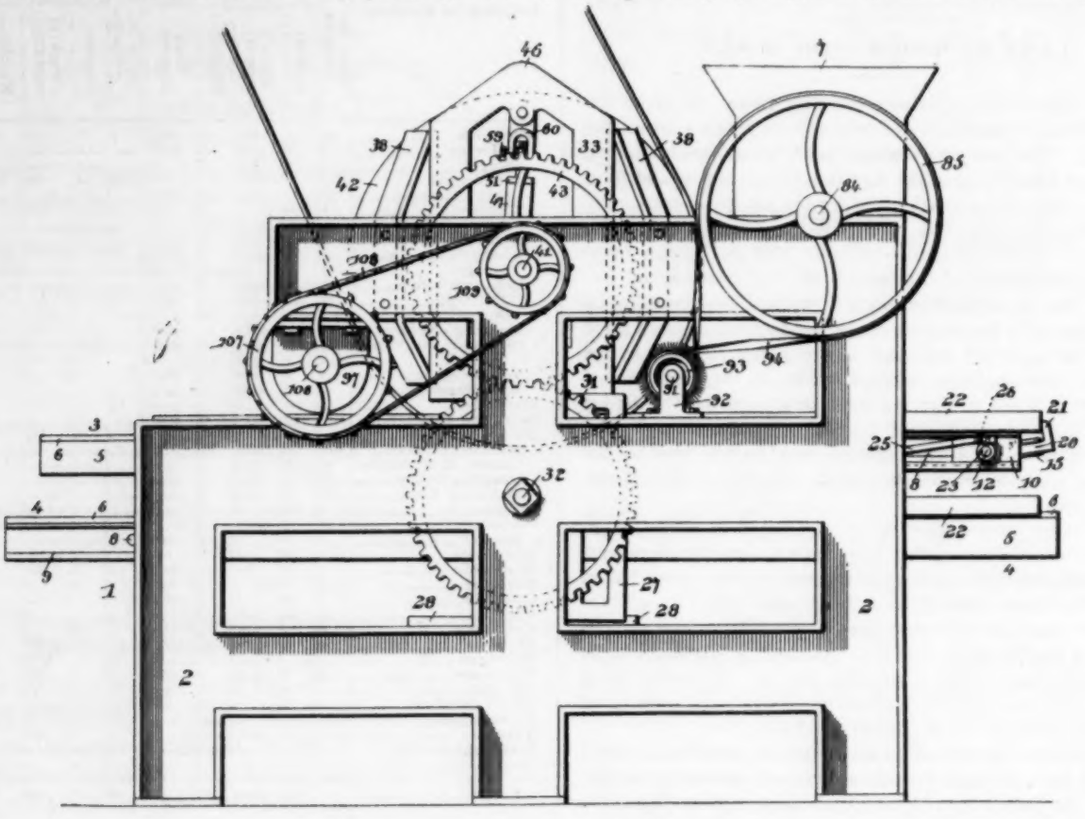


FIG. 1.—CORE-SAND-MOLDING MACHINE.—ELEVATOR.

The sections or halves of the core boxes are designed to be arranged or laid side by side on the slide-tables 3 and 4. The core-box sections 22 are preferably provided at their under sides with the V-shaped slide-grooves 22*a*, which register with the V-shaped guide-ribs 6 at the upper edges of the guide-rails 5, so that the core-box sections will maintain their positions on the guide-rails of the slide-tables while moving from end to end. It will be noted that the entire series of core-box sections 22 on the upper slide-table hold the sand core at various stages of completion, while the entire series of core-box sections on the lower slide-table are empty, and are continu-

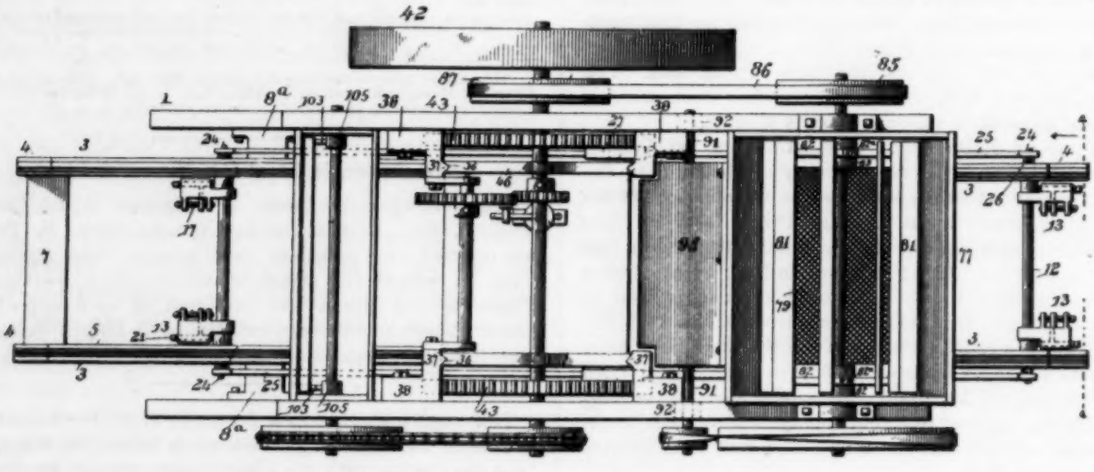


FIG. 2.—CORE-SAND-MOLDING MACHINE.—PLAN VIEW.

ously moved toward that end of the upper table on which the core-box sections are first placed to receive their filling of sand for making the core.

Without going into the details of the construction and operation of the machine, which have been indicated in a general way above, reference may be made to an exhibition recently given at Buffalo, witnessed by radiator manufacturers and others. The machine on this occasion made 11 perfect two-bar radiator cores per minute, with the aid of three attendants —one to place the empty core-boxes at the forward end of the machinery, a second to take them away from the rear end, and a third to supply the hopper with sand. The limitations upon the output are those imposed by the work of putting on core-boxes and taking off completed cores.

The inventor has made his patent applications cover broadly any machine employing the mechanism indicated, or anything similar for the manufacture of cores. Mr. Ryan's former connection was with the American Radiator Co.

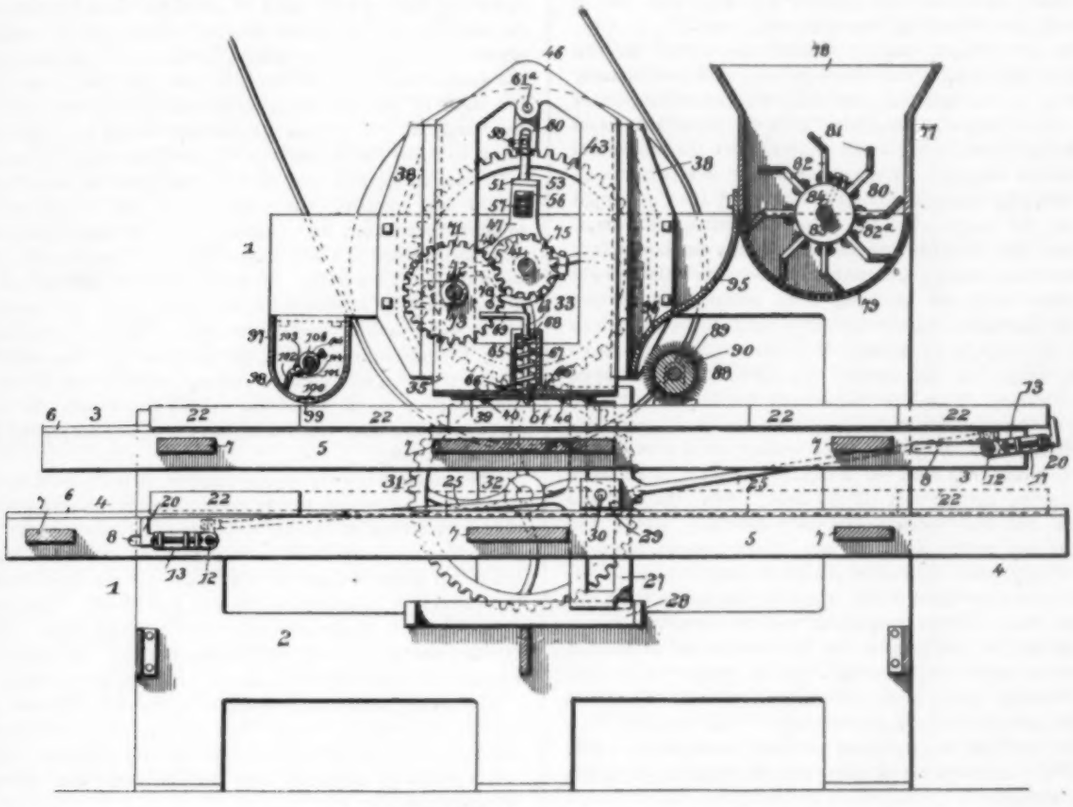


FIG. 3—CORE-SAND-MOLDING MACHINE.—LONGITUDINAL SECTIONAL VIEW.

Mr. Outerbridge on Dr. Harrison's Rumbling Tests.

Mr. A. E. Outerbridge, Jr., whose paper on "The Mobility of Molecules of Cast Iron," read at the Pittsburg meeting of the American Institute of Mining Engineers last February, has caused so much discussion and investigation among experts in cast-iron, sends us this comment on Dr. Harrison's paper, "Freaks of Foundry Iron," published in our issue of Jan. 7, as read before the Pittsburg Foundrymen's Association:

"The 'rumbling tests' are of course interesting to me, as the transverse records not only corroborate fully from an independent source the claims announced in my paper contributed to the proceedings of the American Institute of Mining Engineers, February, 1896, but far exceed the records tabulated therein. The maximum gain there stated was 525 lbs., or not quite 19 per cent, due to rumbling test bars 1 inch square, broken with supports 12 inches apart. Dr. Harrison's maximum gain under similar circumstances is 1,050 lbs., or 44.68 per cent. The average gain in nine tests is not quite 19 per cent, or the same as my maximum gain. Other investigators have sent me similar reports. An explanation of the probable cause of variation in 'tensile tests' of unturned bars may be found in the *Quarterly Digest of Physical Tests*, July, 1896, p. 237 *et seq.*" [Reproduced in *The Iron Trade Review* of Aug. 6, 1896.—ED.]

OBITUARY.

Maxwell K. Moorhead, whose serious illness was noted last week, died at his home in Pittsburg, Jan. 13. He had been in poor health for several years and his illness became critical two weeks ago. From 1856 to 1894 Mr. Moorhead was engaged in the manufacture of iron at Pittsburg, in the former years entering into a partnership with W. Dewees Wood and George F. McCleane in the iron business at McKeesport, under the name of Wood, Moorhead & Co. In 1858 this was dissolved by the removal of Mr. Wood to Philadelphia. The firm continued under the name of Moorhead & Co., and in 1859 removed from McKeesport to Soho, where the Soho blast furnace, galvanizing works, sheet and rolling mills were built. In 1894 these became the property of the Pittsburg Steel & Iron Mfg. Co., and Mr. Moorhead retired from participation in the business. He then succeeded his father in the presidency of the Monongahela Navigation Co., the latter having held the position for 40 years. Mr. Moorhead was in his 65th year.

George W. Goetz, the well-known metallurgical engineer and chemist, died at his home in Milwaukee, Jan. 15. He was 42 years of age. He had been engineer of the Illinois Steel Co., the Krupp Works, and a number of prominent mining companies.

Received from the Trade

In a pamphlet entitled "Information on the Preservation of Iron and Steel Structures," the Goheen Mfg. Co., of Canton, O., gives a liberal reprint from what Wm. Broom, analytical and manufacturing chemist, London, Eng., has written on the coverings for metals that are most economical and that afford the best protection. The writer discusses linseed oi priming, red lead, white lead, graphite paint, oxide of iron paints, "emulsion" paints and carbonizing coating. Oxide of iron is referred to as the pigment now in most general use for iron work. The writer says that this, or any other paint containing sesqui-oxide of iron, under proper conditions, is worthy of a high place as a protective agent for iron and steel, but that it has not reached the point of perfect protection under varying climatic conditions and exposure to gases. He gives first place to non-porous carbonizing coating for length of service and for ability to withstand sudden changes and extremes of temperature.

KEEPING FOUNDRY COSTS.

Four brief papers on "Foundry Costs" were presented anonymously at the last meeting of the New England Foundrymen's Association. We select the following as representative:

The question of cost in a foundry seems at once the most important and the one most difficult of satisfactory solution. As the writer understands the case, the things to be desired are these: 1. To be able to know for a fact the cost per pound of each class of work, or of each separate job in the shop. 2. To be able to estimate with reasonable accuracy the cost of a class of work presented for the first time.

So many different items of expense enter into the cost of castings that it is an intricate problem to determine just what part should be borne by each job or each class of work. Conditions vary so in different shops that no rule can be laid down that will fit all cases, and yet possibly a general plan can be presented which will help in some particular case.

It is not a very difficult matter to learn the cost of the iron melted and in the ladle, if one follows closely and intelligently the weighing of the material; but this, the very vital part of the whole investigation, is too often left to the unreliable hand of some helper, who wheels the material to the stage and guesses that it weighed so much, and that so much was on the stage when he dumped his first load, and that so much was left on the stage when the bottom was dropped. Having care that the weights are taken by some one competent and interested to obtain accurate results, set down the weight and purchase value of the pig iron, scrap iron, sprues, fuel and all the other material actually used in the heat or in preparing the cupola or ladles. To this, of course, is to be added the wages of the melter and all the help employed about the furnace. If a careful record has been kept for a year or so of the expense of keeping the furnace in good condition, relining and repairing, it is known what sum should be added to cover that item for a day. The total of all these items gives the actual cost of the heat. After the cast has been made and the bottom dropped, carefully weigh the sprues, partially melted scrap, if any, in the bottom, and bad castings, if any, also surplus material on stage, if any. Ascertain the purchase value of the whole and deduct it from the cost of the heat, and the remainder will be the total net cost of the iron, and of melting it, for the number of pounds of good castings turned out. Divide it by the number of pounds of good castings and it gives the cost per pound. All this is very simple and perfectly apparent, and if the heat be of an average size and the results about as usual, a single day's test is as good as any number of days, and the results can be accepted as correct.

It is perfectly clear that in small heats the cost per pound of melting the iron will exceed that in large heats, but whether the heat be large or small, one making this test for the first time will be surprised to find how little it costs him per pound to melt his iron, and how much iron he loses in shrinkage.

To find the other items of cost, that is, labor and expense, is not so simple. Indeed, it may be set down as impossible to frame any formula that shall exactly meet the first requirement named at the commencement of this article, viz., the absolute accuracy in reckoning costs. There are too many indefinite factors, too large an element of uncertainty and risk in practice, and too many variable quantities. Still, it is believed the following plan, if carefully followed, will fairly meet the second requirement mentioned, viz., estimating new work with reasonable accuracy.

The first step is to learn the total fixed charges for any given time, preferably for one day, as in the case of iron and melting. Under the head of fixed charges the following are to be included, and for convenience they are to be reckoned for a year, and the total divided by the number of working days in a year.

Rent or interest on investment, taxes, insurance of all kinds, depreciation of plant, water rates, lighting, heating, office expense, superintendence, power.

There are other charges which vary with the volume of business done, but which can be reckoned approximately from the books of the previous year's business, such as teaming or freights in delivering castings, carpenter's time and lumber in keeping flasks up to value, and barring off and altering same.

Then there are also the supplies, core sand, molding sand, facings, flour, beer, small tools, brushes, rammers, shovels, etc. Coal for core ovens, and all the thousand and one petty items which constitute one of the great "outs" in the foundry business, and which are usually charged off on the books under the comprehensive heading of "Miscellaneous Expenses." Then add as much as your self-esteem will permit and as little as your conscience will allow for "bad debts." Count in under the head of "Unproductive Labor" every dollar of your pay roll except the molders, coremakers and chippers, and by that time you will begin to realize that the reckoning of costs in a foundry is a very serious matter, and that it differs greatly from any other reckoning of costs that you know of. You will wish at once to raise the prices of every customer on your books, for you will begin to understand what a load of expense each pound of your output has to bear. After you have got the total of all these items for one year or for one day, as you choose, ascertain what you have paid your productive help, your molders, coremakers, and chippers, for the same time, and divide the sum you have paid them by the total of all the expenses as indicated above. Your answer will be the proper percentage to add to your wage account to cover the actual cost of your labor and expenses.

In reckoning the cost of any one piece of work then, you would add together three items. 1. The wages paid your molder, coremaker, and chipper. 2. The percentage of that sum ascertained as above described. 3. The cost of your iron melted and in the ladle. If a new job were offered you would guess as nearly as you could how much work the union would allow your molder and coremaker to turn out for a day, how long it would take your chipper to clean it. You would reckon their wages, add your percentage and the cost of your iron, and if your guess as to the weight you would get for a day were a close one, you would have a figure very near the cost of your casting.

This method has its objections, but it is claimed for it, that it is as nearly correct as any method can be under the unavoidable conditions of actual practice. In order to be brought very close to perfection a schedule of expenses should be made up quite frequently and new percentages obtained as the volume of business increases or falls off. The same rule applies here as elsewhere, the more castings made, the cheaper they are made, and vice versa, because the fixed charges remain the same whether the output be large or small.

The correctness of this method is capable of proof by reckoning your profits for a year in the usual way from your books, and reckoning your cost by this method. If the account has been carefully kept they will be found astonishingly near together.

In conclusion, let us hope that the time is at hand when foundrymen will not have to meet such competition as will compel them to split hairs in reckoning costs.

THE House, on Monday, passed the bill authorizing the Braddock & Duquesne Bridge Co. to construct a bridge across the Monongahela River at Braddock. The House also extended until July 15 next the time for the construction of the bridge now being erected across the Monongahela in Mifflin Township by the West Braddock Bridge Co.

THE directors of the Pittsburg, Bessemer & Lake Erie Railroad met in Pittsburg, January 20, and completed their organization by electing Col. Samuel B. Dick, of Meadville, chairman; James H. Reed, president; J. T. Odell, vice-president; R. A. Franks, secretary, and T. Hart Given, treasurer.

A GENERAL reduction in salaries of officials, office men and clerks, and of other employes except day laborers and those governed by the Amalgamated Association scale, has been made by the Mahoning Valley Iron Co., Youngstown, O.

JOHN T. CALACHAN, Jr., and Julius E. Rettig, of Washington, have been appointed by the Navy Department assistant steel inspectors at Homestead.

THE ELECTRIC CAMPAIGN.

A REVIEW OF RECENT PROGRESS.

Written for THE IRON TRADE REVIEW.

In the adaptation of electricity to the uses of man a wide expansion has occurred in the past two years which could hardly have been predicted from the comparatively slow adoption of electricity as a prime source of illumination and transportation. The development in question has been made in the direction of the transmission of power, over long distances not only for lighting and railway purposes, but also for purely power purposes in factories, mills and shops, as well as in mines.

The growth of the electric lighting industry began in the early eighties, and sanguine predictions gave hope of a speedy and universal introduction of that form of illumination in lieu of existing methods. Electric lighting passed, through a period of extraordinary inflation, but although it is twelve years since the introduction of the Edison system in its complete form, electric lighting is to-day far from universal, while its rival gas is by no means defunct or even decrepit. This is due to a variety of causes, chief among which may be mentioned the uneconomical and inefficient form of early apparatus for generating, distributing and utilizing the current. The result was obvious. The current could not be generated cheaply, and the electric light proving too costly, deterred would-be consumers from adopting it. It is only within the past few years that electric lighting apparatus has been brought near to perfection. To-day, the current can be generated in dynamos of almost 100 per cent efficiency, to illuminate lamps of sustained candle power during long life, and gas will probably shortly find its place in domestic economy somewhere else than for pure illumination.

The adoption of electricity on railroads, while it has passed through phases almost identical, was more rapid. The first electric railroads were installed during 1885 to 1887, and no great stride was made until, even with the inefficient apparatus then at command, the original roads were seen to be commercial successes in fact or in possibility. Rapidity of transit in cities was a necessity, and the spirit which had called for the cable, called still more clamorously for the electric railway motor. Rapid transit was no luxury, and thus electric railways multiplied daily. Up to three or four years ago, it seemed as though no further fields for the railway motor to conquer were possible, and yet what it had done theretofore was but one step in the direction of universal electric traction. The city road, fully equipped, was spread out to the suburbs. The next step was the connection of towns and cities by the trolley; and the junction of Minneapolis and St. Paul, with its splendid financial results, opened up a new vista. Improvement after improvement followed each other rapidly in the apparatus, and inter-urban roads began to spring up as developments and extensions of existing systems. This brought a new feature into the world of travel, and the steam roads finding their supremacy menaced, awoke to the seriousness of the changed condition. Two of the main trunk lines, the Baltimore & Ohio Railroad and the New York, New Haven & Hartford Railroad bestirred themselves. The former now utilizes electricity to haul its heaviest trains through its mile and more of tunnel at Baltimore; while the latter, satisfied with its experimental line at Nantucket and East Weymouth, is undertaking large extension of electrical traction at various important points of its vast system. The boom of the electrical railroad has not subsided—it seems to have but just begun.

The adaptation of electricity to the transmission of power over long distances, and its admission to mills and mines, may be said to have slumbered for a good eight years. The field was not ready—the older methods were too strongly intrenched to be ousted without a struggle, and the new force was unequal to the task. Mine owners and mill owners were differently situated, and a change of motive power was more seriously to be considered than the installation of an electric lighting plant or railway system which began *de novo*. Nevertheless, some power transmission and motor plants were installed, the principal and best known being that at Ouray, Col. This installation practically started what has become an extensive and growing department of the electrical industry. It served as the pioneer and the missionary, but a tremendous and energetic propaganda had to be carried on to educate the mill and mine operator before he would consent to throw away his steam apparatus and sink his money in a new investment.

This propaganda began to be vigorously waged early in 1893, and the four years which have elapsed since then have shown the value of a campaign of education. Taking the figures of one prominent electrical manufacturing company, it is shown that up to the end of 1892 not more than 13,719 horse-power in electric power apparatus had been sold and installed by it. In 1893, the amount sold reached, for the year, 18,762 horse-power; in 1894, a sudden expansion developed, and not less than 42,379 horse-power was sold, while in 1895 the apparatus sold amounted to 46,727.

Still more conclusively does 1896 show the widespread use of electricity in power work. From Jan. 1 to July 1 the company in question had sold 48,000 horse-power in apparatus During the same period in 1895 only 25,737 horse-power had been disposed of. During the first eighteen days of August the total was increased to 62,164 horse-power, or nearly 1,000 horse-power per day—a result which shows that, notwithstanding the terrible depression in business which followed the presidential elections, operators of power plants invested in economical apparatus and brought into subjection hitherto waste forces of nature.

The sudden growth of the power transmission branch of the electrical industry is due to the recent developments in the knowledge and application of the alternating current. The use of the direct current, while perfect so far as the motor is concerned, became too costly as soon as it required to transmit power by its means over long distances. Thus, when it became necessary first to transmit power over long distances and then to utilize the energy in motors, the necessity compelled invention. The introduction of the multiphase system solved the problem and gave to the electrician a means of transmitting power over many miles, supplying him at the same time with an alternating current motor in which to utilize it.

The new system found a field ready for it in the far West, and indeed all over the country is places where coal was scarce and consequently costly. Waterfalls were eagerly acquired, and examined as to the possibility of their utilization. In California and Oregon three noted water-powers are now transmitted over many mills—the waters of the Willamette give power which is employed to run motors in Portland, Ore., 12½ miles away; those of the American River at Folsom supply light as well as power to Sacramento, 24 miles away; those of the San Joaquin to Fresno, 35 miles away. At Ogden a power house is in course of erection which will contain water wheels driven by water brought through a pipe nearly seven miles long. These wheels will drive generators from which the current will speed by wire to Salt Lake City, 36 miles distant, and even as far as the mines of Mercur, some 30 miles further on. Other notable power transmission plants are operating successfully in many different places in the United States, some exclusively used to drive and light mills and mines, others to operate all kinds of machinery, street railways and arc and incandescent lamps. One district should be mentioned—that of the Lachine Rapids, where 12 1,000 h. p. dynamos will be set up to supply current to Montreal for all imaginable purposes.

Each plant represents a very large investment, in water rights, real estate, buildings, hydraulic and electrical machinery and line, and yet each will, if it has not already, prove a success, warranting the disbursement and reimbursing the investor.

Leaving on one side the great question of electrical power in mills, which has been frequently treated in our columns, let us see how it has been adopted in mining work. Throughout the anthracite and bituminous coal mining regions the electrically equipped mine is no longer an exception. Mine after mine has discarded its steam and air apparatus for the electrical. Electric locomotives have superseded the mine mule and the cable, and even where the latter is retained the cable engine is now an electric motor. The mine hoist is geared to a motor, as is the mine ventilator. The mine pump driven by the motor requires no attention beyond an occasional oiling, and may be stopped and started from the

surface or from any point in the mine by the simple process of closing a switch. The electric coal cutter undercuts the coal with a rapidity distressful to the hand pick, and gives a greater quantity of lump and marketable coal.

In an electrically equipped mine are no labyrinths of steam or air pipes, no leaky valves, no condensation, and no loss of power. It can be operated winter and summer alike, for electricity does not freeze. The power comes silently into the underground passages over small insulated wires, is always ready at call, and when not actually used makes no demand upon the coal heap beyond that required to move the engines. The electric locomotive picks up the load, moves it faster and does more work in a day than could either the mule or the rope, and each electrically operated machine steadily works with the minimum of attention possible.

In metal mining, electricity is finding as large a demand as in coal mining. At Aspen, Col., is the largest electrical hoist in the world, raising immense loads of ore to the surface. At Ouray, Col., silver mines which could not be worked remuneratively by steam are now on a paying basis because operated by electricity generated at a low cost by water power. At Silverton, in the same State, the great Stoiber mines are almost exclusively operated by electricity, which runs the concentrators and milling machinery as well as all the other different machines scattered throughout the mines; and even in Mexico large silver mines are driven by water generated current.

Instances could be multiplied, but enough has been written to show the benefits which accrue from the subsitution of electricity for other forces in mining works, and the tremendous economical advantages which the possibility of utilizing a water-right confers. The progressive man will investigate, the cautious man may; but the result will be the same—a conviction that electricity is the ideal power.

The leaven of the propaganda of the early nineties is working, and while prediction is always unsafe, our sense of security is not alarmed at our prophecy that during 1897 a vast increase in the use of electricity for power transmission and mining work will be noted. Niagara has been harnessed, and it is highly probable that in 1897 even the culm banks will be levied upon for some of that latent power which has so long lain undisturbed within their vast masses. M. J. H.

FROM ANOTHER STANDPOINT—LINES OF ADVANCE IN THE NEAR FUTURE.

Written for THE IRON TRADE REVIEW.

"Where are the greatest possibilities for the useful application of the electric current?" was the question recently asked of one of our foremost electrical men in this country, and he replied: "Well, that is a 'poser'!" and then, after a moment's hesitation, he added: "I do not know."

Now, this gentleman is probably better posted on the developments of the electrical industry than any other man living, and if anybody knows anything on the subject he should, yet he was afraid to commit himself. I think he was right in being cautious, for the discoveries of new fields for the application of electricity have been so manifold, so rapid, and the introduction of some of these developments have produced changes so wonderful, that it would take a wise man indeed to be able to foretell what the coming year will bring forth. To better appreciate this fact, it might be well to take a condensed retrospect of the achievements with the electric current in the last decade.

At the beginning of 1887 electric lighting was still in the experimental stage. Its application was confined to limited areas in the large cities of this country and Europe. At that time the distribution of electricity by the direct current system was the only method in vogue. This system had element tary qualities, which made a rapid growth of electric lighting impossible, its chief objection being great cost of installation and operation. Then came the alternating current system. All at once the introduction and general use of electric lighting bounded forward, and to-day there are constantly burning about 10,000,000 electric lights.

Next in importance come the electric railways. In 1887 there was not a single electric road in the world that was generally pronounced as a commercial success, a few—probably less than five—were in practical operation. But how is it to-day? There are in the neighborhood of 2,000 electric railways in operation in this country and the old world, operating over 20,000 cars and 100,000 electric motors. And all this has been accomplished within less than ten years.

The transmission of power is another field where the application of the electric current has produced some wonderful developments. It has enabled the opening up and utilization of industrial resources that had lain dormant or had gone to waste because there was no way of making them available. Numerous mines, which had been abandoned, were started up afresh; as an instance the Telluride mines in San Miguel County, Col., may be cited. These mines had been abandoned because, being situated on the mountains, the cost of transporting fuel to work them was so enormous as to make their operation unprofitable.

Take into consideration, also, the amount of water power that had been going to waste for centuries, but which now through the introduction of electric power transmission has been made available. In this connection it is but necessary to mention the great power plant of the Niagara Construc tion Co., at Niagara Falls, where 15,000 horse power are utilized and distributed among numerous industrial enterprises for miles and miles. Apropos of this may be mentioneds the fact that only a few days ago the Niagara Construction Co. contracted for an additional number of generators, so as to bring the capacity of the plant eventually up to 50,000 horse power.

The wonderful developments that have been made in this field of electrical application are largely due to the inventions of the great electrician, Nicola Tesla, who in his invention of the polyphase system of electrical distribution rendered electrical power transmission for long distances commercially practicable and successful.

It has also been through the development of the Tesla polyphase system that the application of power in the operation of factories, mills and mines has made the great strides now demonstrated in many industrial establishments. Wherever the electric current has been introduced to run machine tools, to operate cranes, to work rolling mills, it has invariably succeeded in securing superior economy, more regular operation and an improved product.

In this field, it is safe to predict, electricity will find its greatest activity in the coming year. Manufacturers, mill and mine operators throughout the country are waking up to the many advantages that may be derived from the utilization of the electric current, and they are not slow to adopt innovations that will facilitate production and help them to improve the quality of their product.

Already a number of large industrial establishments in this country are exclusively operated by electricity. Among the foremost of these establishments are the Carnegie Steel Works at Homestead and Braddock, Pa.; the Westinghouse Machine Co.'s works and the Westinghouse Electric Works, at East Pittsburg, Pa.; the Milwaukee Harvester Co.'s works at Milwaukee, Wis.; the Cheney Bros.' mills, at South Manchester, Conn., and the Baldwin Locomotive Works, at Philadelphia. H. H. E.

WHILE Fayette Brown, of Cleveland, was receiver of Brown, Bonnell & Co., of Youngstown, he commenced suit against the Mahoning Gas Fuel Co. for damages in not carrying out a contract to supply gas, and secured a judgment for $48,000. The case was carried through the courts by the gas company, and the Supreme Court of Ohio on Jan. 19 affirmed the judgment which, with interest, amounts to over $60,000.

AT Steelton, Pa., last Thursday, a carriage containing H. H. Campbell, superintendent; Frank Tenney, assistant superintendent, and J. V. W. Reynolds, superintendent of the bridge and construction department of the Pennsylvania Steel Works, was struck by a train. The horse was killed and the vehicle wrecked. The occupants of the carriage, however, escaped uninjured.

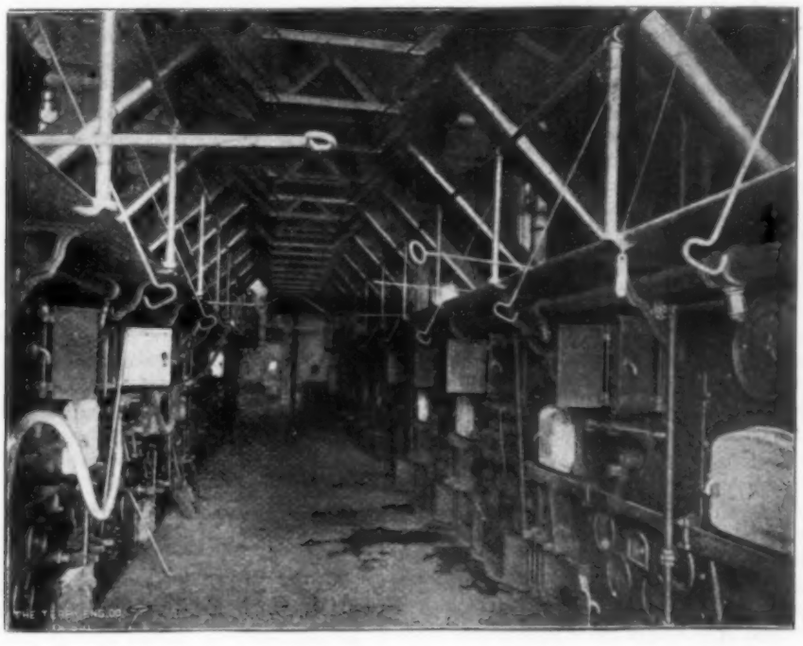
The Ironton (O.) Nail Works have resumed after a year's idleness.

COAL AND ASHES HANDLING PLANT.

A complete Jeffrey coal and ashes handling plant is in operation at the plant of the Cicero & Provision Street Railway Co., Chicago. The illustration which we present shows the boiler fronts, with the overhead coal-storage bunkers, from which the coal is fed on to the stokers. Wagons deliver the coal, either slack or lump, to chutes terminating over a double-strung flight conveyor, which conveys the coal to a tooth-crusher (if lump coal is used) to crush it to size. From this it is spouted to a bucket elevator, which raises and delivers it to either one of two spouts, one spout terminating over the upper trough of the initial conveyor, which carries the coal to the storage bin, the other spout terminating over the cross-angle conveyor.

This angle conveyor delivers the coal to a longitudinal conveyor, over the coal bunkers, gates being provided in the trough at suitable points to permit of filling the bunkers. From these bunkers coal is spouted to the mechanical stokers, as shown.

The ashes-handling outfit, located in the basement, consists of two 12-inch cast-iron spiral conveyors. These receive the ashes directly from the grate bins under the boilers and deliver them to the cross-conveyor. Thence they are taken by a continuous bucket elevator and spouted to an ashes receiving tank on the outside of the building. Each part of the system is independently controlled by friction clutches. Power for the whole system is furnished by an automatic engine located in the basement. This plant was designed and installed by the Jeffrey Mfg. Co., Columbus, O.



COAL AND ASHES HANDLING PLANT.

Important Plans of Youngstown Mills.

Dispatches of Jan. 15 from Youngstown, O., contained the statement that negotiations were in progress for a merging in one company of the Brown-Bonnell Iron Co., the Mahoning Valley Iron Co., and the Union Iron & Steel Co. The deal was said to involve the rolling mill plants of the three companies and the furnaces operated by the first two. Denials have been made by the officers of each company, who say that no such combination as that referred to has been in contemplation, and that there is no probability of such a consolidation being effected. The Youngstown *Telegram*, which gives these denials, gives publicity to the fact that some plans were under discussion that would secure close co-operation between the plants in question. "Under the negotiation pending it was expected to avoid much needless and hurtful competition between local industries, and to secure such trade for local product, as against foreign competition, as could be secured by an agreement whereby the industry being the best equipped to meet outside competition should be allowed to engage in such competition without the interference or competition of the other local concerns. At the same time it is proposed that the different industries shall continue under the several managements without any agreement of profit sharing or combination of capital.

"It was also expected, should the plans under discussion be adopted—as they have not been—that a proposition would be made to the Ohio Steel Co. to use its product entire and exclusively in the operation of the local mills, thus keeping that plant in constant operation, and by such an arrangement it was expected to secure such a benefit of rates that the local mills could meet any prices for finished product set by foreign competition and thus keep all the plants in operation. This is simply the outline of the true plan under discussion, the details being matters which it is not desired to have published at this time. The entire negotiations were had with an idea of, if possible, setting the mills in operation and giving work to the many employes who have been so long idle."

ANNOUNCEMENT is made under Pittsburg date of Jan. 19, by the Sterling Steel Co., Pittsburg. C. Y. Wheeler, president, and Thos. Firth & Sons, Ltd., Sheffield, Eng., Lewis J. Firth, managing director, of the consolidation of the American crucible steel business of the English company, with the Sterling Steel Co., under the title of the Firth-Sterling Steel Co. The capital stock is being increased to $800,000, and the works at Demmler will be enlarged so as to turn out any quantity of steel that may be required. The steel department at Pittsburg will be under the direct management of Lewis J. Firth. All brands of Sterling tool steel will be manufactured as heretofore, and Thos. Firth & Sons brands of Sheffield tool steel will be manufactured in Pittsburg on the same lines as in Sheffield. The projectile department will be entirely under the charge of Mr. C. Y. Wheeler, who will be the president of the Firth-Sterling Steel Co. While devoting his time largely to the development of the Wheeler-Sterling armor piercing projectiles, he will also give attention to the various brands of Sterling tool steel. Abbott, Wheelock & Co., who have represented Messrs. Firth for over 40 years, and the tool steel business of the Sterling Steel Co. for the last two years, will be the selling agents for the Firth-Sterling Steel Co. Stocks of Firth and Firth-Sterling steels will be carried by them in the warehouses attached to their offices in New York, Boston and Chicago. In addition to this considerable stocks of ingots and finished steel will be carried at Demmler. The same brands of Swedes iron used at Sheffield will be used in the operations at Demmler.

THE Thos. D. West Foundry Co., Sharpsville, Pa., is enlarging the capacity of its foundry. Of late the company has been very busy and it will be able to use to good advantage the increased room it is now securing

ECONOMIES OF COMPRESSED AIR.

The Western Railway Club, at its December meeting, had interesting contributions to the discussion of a paper by Mr. McConnell, on compressed air, read at the meeting in November.

Mr. Wm. Forsyth, of the C. B. & Q. Road, said: "I have been requested to describe an air compressor which was built under the direction of our master mechanic at Aurora, and the principal merit of which is the low first cost compared with its capacity. The air cylinder of the compressor was attached tandem to a large Corliss engine, and its capacity is 320 cubic feet of free air per minute and its cost was less than $300, so that the air compressor cost us less than $1 per cubic foot of free air delivered. The Corliss engine has 18 x 48 double cylinders, and the air cylinder is 10 inches in diameter, and of course has a 4-foot stroke. The engine makes 75 revolutions a minute, so that there are 150 strokes per minute or 600 feet per minute piston speed. That is probably twice as high as a good air compressor should run and we are thus running at that disadvantage. To see how the efficiency of this compressor would compare with others, we can take up the four sources of loss in air compressors and see what losses there are in this one. The first is loss by friction. We have in this design the minimum of friction, because we have the fewest parts. We have one piston and one piston rod, while almost any other type of air compressor of equal capacity is likely to have four cylinders with four pistons and four piston rods, with all the friction connected with them, besides the journal friction connected with the fly-wheel shaft. In that we have our principal advantage in this compressor. The second source of loss is that due to the increase in temperature of the inlet air. We tried to minimize this by a water jacket and keep the cylinder cool by running water around it constantly. The third source of loss is that of heat due to compression, and our only way of avoiding that loss would be to put another air cylinder on the end of the other steam cylinder and connecting a cooling chamber between. The fourth loss is due to waste space and clearance. In that we have done the best that we could be putting the valves as close up to the end of the stroke as possible. It would have been better perhaps if the valves had been in the cylinder head, but it is so close to the steam cylinder end that we could not arrange it in that way. We have indicated the engine with the air compressor free, and also when it was compressing air to 80 lbs., and found that it required 40 h. p. We get a horse-power with the Corliss engine with 4¼ lbs. of coal per hour and the air compressor consumes 204 lbs. of coal per hour, and at $3 a ton the cost of 1,000 cubic feet of free air compressed to 80 lbs. is 10 cents. With coal at $1.50 per ton it is of course only 5 cents per 1,000 cubic feet. I have a photograph of the cylinder here and blue-print drawing also.

Referring to the paper under discussion, I would take exception to one of the suggestions in the latter part of the paper relating to the use of compressed air for furnace blast and for forge fires. That is probably the most expensive application of compressed air that I have heard of, and it costs at least ten times as much to produce blast in that way as it would with a fan; and this brings us to the wastefulness of the application of compressed air. I believe that this is the next thing that we must go after, and that there is a larger field perhaps in effecting economy in getting efficient tools to use for the application of compressed air than there is in perfecting any further the air compressors. This will be readily appreciated when we remember that if we have an air leak from an 80-lb. pressure through a hole ¼ inch in diamater it will use up more than a 10-h. p. compressor can deliver. Now in going through the shop the other day I noticed that one of the apprentice boys had a hose connected to the air pipe and he was blowing the chips out of the hole he was drilling in cast iron, and the power used in getting those chips out was a great deal more than would be required to drive the drill press and boy too. And that is only an illustration of the tendency to waste all through the shop. You will find in the summer time that the men have pipes of that kind where they are cooling themselves with an air blast, and the small holes all about the shops, leakages in the pipes, will used up a great many horse-power of compressed air.

Mr. William A. Parker (Ingersoll-Sergeant Drill Co.): We have gone on in the improvement and manufacture of compressors until we can confidently say that with a four-stage compressor, with the Corliss valve gear, compound condensing type, we can produce 1,000 cubic feet of free air compressed to 1,000 lbs. for less than 2½ cents. This is by actual test. There are tests going on to-day in the city of New York with a four-stage compressor which will in a short time be completed, and then we shall have authentic figures, for compressing air to 1,000 lbs. and over per square inch. I think we can safely say that with compressors of the straight line type, with the common Meyer valve with adjustable cut-off, that we can produce compressed air, with coal at about $3 per ton or less, for less than four cents for a 1,000 cubic feet of free air compressed to 100 lbs. This includes all expenses of operation and interest on investment. Great advances are being made in the shops of manufacturers, looking towards improvements in air compressors. An important feature is an air cylinder thoroughly water jacketed, both body and heads. Small clearances are also of great importance. This has been reduced to a minimum of less than one-half of one per cent. By a concentrated inlet the air should be drawn from wherever it is coolest, driest and freest from dust and impurities, from a basement if possible, where the air will be 60 degrees or below in temperature. We all know that the temperature of an engine-room is often 70 degrees, and sometimes 80 degrees, and we lose volume by taking heated air into the compressor.

Mr. J. F. Lewis (Rand Drill Co.): There is a great increase of efficiency in reheating the air before it enters the working cylinder. Of course it costs something to do this, but the cost is very small compared with the increased efficiency. This has been demonstrated in using compressed air for street car propulsion. During an experiment the cars were run about 40,000 miles. The air was carried in storage tanks at from 600 to 800 lbs. pressure, being passed through water-heated to 360 degrees to a reducing valve and direct to the working cylinders, where it was used at from 50 to 150 lbs. pressure, according to the grades or the condition of the track. It was found that the cars could be run eight to ten miles when the air was reheated, and only four to five with cold air. This was known as the Mekarski system, which has been used successfully in Nantes for the last eight or nine years, and three years ago street car lines were established in Paris under the same system. They carry the air at a pressure of between 1,100 and 1,200 lbs., reducing it to the proper pressure when used. We have also made experiments in our shops, which convinced us that it produced much better results by being used hot. In Paris, where air is carried about the city for power purposes by what means is known as the Popp system, an efficiency of 92 per cent is claimed with heated air, as against 70 and 72 per cent not heated, and it is believed to pay well to reheat.

I have a letter from Mr. George W. Smith, master mechanic of the A., T. & S. F., Topeka, Kan., in which is given data in regard to the cost of compressing air used in the shops at that point, which gives the following:

Steam pressure, 80 lbs.
Air pressure, 100 lbs.
Tons of coal of 2,000 lbs. per month, 155.
Cost of coal per month, $139.50.
Cost of coal per ton, 90 cents.
Amount of free air per minute, 1,712 cubic feet.
Amount of free air per day of 10 hours, 1,027,584 cubic feet.
Amount of free air per month of 31 days, 31,855,104 cubic feet.
Revolutions per minute, 50.
Pounds of coal per 1,000 feet of free air, 9.7.
Cost per 1,000 feet of free air, .00437 cent.

This compressor is fitted with Meyer adjustable steam valves, compound air cylinders with mechanical air valves on the low-pressure cylinders. Air is taken from outside the engine-room. The above cost is for fuel only; for the air delivered from the compressor, that is the cost of oil, labor and interest on cost of plant, is not considered. The steam cylinders are 20 x 48 inches; air cylinders 28 inches and 16 x 48 inches; horse power, 310.

I will say in connection with this, that there are five miles or over of piping through these shops and yards, in which compressed air is carried to the different tools. As to the saving over the old way, Mr. Smith says:

With the 10-foot reach stationary riveting machine we can drive 2,000 rivets per day of 10 hours, with three laborers, at a total cost of $4.75 per day. This, compared with hand labor, three men, total $7 per day, will drive 200 rivets. The six-foot riveter, the combination flange punch and riveting machine and the bridge and girder riveter will each average about the same as the 10-foot reach riveter. The truck riveters, one machine operated by two laborers at a total cost of $3 pay day, drive 3,000 rivets in a day of 10 hours; as compared with hand labor, three men at a total of $6 in the same class of work who will only drive 175 rivets. The frame riveter will average about the same as the truck riveter. The stay-bolt breaker will make an average saving of $8 a day. The tank riveter will make an average saving of $10 a day. The mud riveter will drive as many rivets as can be handed to it, and will make a saving of from $12 to $15 a day for that class of work. Not only does it make a great saving, but it insures every rivet hole being entirely filled and insures tight work, while a large per cent of hand-driven rivets in mud rings invariably leak and have to be caulked or fullered. The stay-bolt cutter will do the work of 15 men; this looks rather fishy, but it is a fact. You have seen this machine work, and it will very easily cut off 1,500 bolts an hour, while when cutting them off by the old method of hand hammer and chisel you must agree that progress is very slow and that it is hard work. The rotary tapping and drilling machine will do the work of six men. The rotary grinder saves the work of six men. The rotary saw for sawing car roofs saves the work of four men. The pneumatic hammer will save the work of three men. A rail saw saves the work of two men. A rail drill saves two men. The device for operating transfer table saves $6 per day. The machine for revolving driving wheels for setting valves saves the labor of two men. The device for shearing bolts saves the labor of three men. Thirty hoists in various parts of shops save the labor of 10 men at $1.50 per day. Apparatus for loading and unloading oil at the storehouse save $6 per day over the old method. A jack for pulling down car draft sills saves $10 a day. A device for fitting up hose couplings over the old method saves $15 per day. With the pneumatic painting machine, one man does the work of 10 using hand brushes. The machine for tearing down old car roofs saves $8 per day. A jack for raising and lowering freight and passenger cars makes an average saving of three men. The drop pit makes an average saving of two men. The device for sanding engines saves one man. The shifter for switching cars in shop yard saves $50 per week. The coal cleaning device saves 10 men. The flue-roller makes a saving of two men over the old method. The whitewashing machine will do the work of 10 men with brushes.

In another case where the work is different and coal higher, air being used for raising water from deep wells, we have the following conditions:

Steam pressure, 80 lbs.
Air-pressure, 68 lbs.
Tons of coal of 2,000 lbs., per month, 106¾.
Cost of coal per month, $167.60.
Cost of coal per ton, $1.57.
Amount of free air per minute, 352.8 cubic feet.
Amount of free air per day of 24 hours, 508,032 cubic feet.
Amount of free air per month, 15,748,992 cubic feet.
Revolutions per minute, 45.
Pounds of coal per 1,000 feet of free air, 13.5.
Cost per 1,000 feet of free air, .0106 cent.
Amount of water pumped, 76,255,000 gals.
Cost per 1,000 gals., $ 002.

The compressor is fitted with Meyer adjustable steam valves; the steam cylinders are 14 inches in diameter by 22-inch stroke. The air cylinders are simple, 14 x 22-inch, and are fitted with mechanical air valves, the air being taken from outside of the engine-room. The above cost is of the air delivered from the compressor for fuel only; that is, the cost of oil, labor and interest on plant are not considered.

Mr. J. N. Barr (C. M. & St. P.): After what I have heard about air, I think it is far ahead of electricity. I have a living example of that. I know that the air flue roller expander saves two men. I had an experience the other day with an electric flue roller. We put one in operation; it was recommended to me as very economical, and I was walking through the shops and thought I would look at it specially. As I went about I saw that one man was standing at the switchboard, another was steadying the motor, another was holding the roller in the front end, and there were five men on the work altogether.

One of our roundhouse foremen got up a very ingenious device. He had a sort of crane about 8 feet high, fastened into a socket which he would fasten to the side of an engine whereby one man could lift off a steam chest. I went into the shop one day, and a gang wanted to lift off a steam chest casing, that was all, and three men put that apparatus up and lifted the casing off. That is all that they did with it. I was a little out of humor, and I ordered the thing put on the scrap pile. This is to illustrate the importance of drawing a line between what are sensible and practical applications of compressed air and what are foolish, and I am a little inclined to think from some things I have seen and heard that a great many of us are getting into applications that verge on that order.

When compressed air begins to compete with electricity as a rotary agent, I feel inclined to think that it is tackling a problem in which it is coming out second best. It looks to me now that for rotary motion and continuous work compressed air is going to have a very hard time maintaining itself beside electricity. The development of both at the present time is comparatively new, and that opinion may, when you look at it a few years hence, sound like arrant nonsense. However, it remains to be seen.

I note the remarks that the production or compression of 1,000 cubic feet of air to 100 lbs. is as low as one cent. The statement was that the cost of compressing 1,000 cubic feet of free air to 100 lbs. pressure was one cent. Does that include fuel, attendance and repairs?

Mr. Lewis: That means fuel only. The attendance and oil and waste, I suppose, would just about double the cost.

Vessel Work Under Way in the United States.

The *Marine Review's* annual report of ship building in the United States shows the effects of the financial uncertainty of the past year. Dec. 31, 1895, there was $8,549,000 worth of new tonnage in lake ship yards. The Bessemer fleet represented $2,520,000 of this, so that taking out this unusual order, the value of tonnage building is about half what it was a year ago, and practically the same as in 1893 and 1894. There are 14 large steel vessels among the 31 under construction, seven steamers and seven schooners or barges. The building of the schooners and the increased draft to be available next season will make the capacity fully half as much as that of the vessels building a year ago. The building of wooden steamers or barges of any size is now confined to one yard, that of James Davidson, West Bay City, Mich. Last year five yards were engaged in this work. In 1895, F. W. Wheeler & Co., West Bay City, Mich., led in the capacity and value of tonnage under construction, and this year the Chicago Ship Building Co. takes the first place with tonnage having capacity for nearly 20,000 tons and a valuation of three quarters of a million dollars.

In coast and river yards there are 65 merchant craft of all kinds under construction, having a valuation of $2,417,600 as against $6,577,650 a year ago. At that time there were building three passenger steamers valued at nearly $2,000,000.

Taking this into consideration the decrease in coast building is about the same as on the lakes. The only merchant vessels of importance in coast yards are a passenger steamer for the Old Dominion line building at Chester, Pa., and a freight steamer for the Merchants' & Miners' line and a steam yacht building by Harlan & Hollingsworth, Wilmington, Del.

Although the total amount of United States naval work under construction is only $16,772,342, about three quarters of a million less than a year ago, it is more satisfactory to coast builders, for owing to the construction of 18 torpedo boats it has been distributed to a much larger number of ship yards. Last year six ship yards had naval work and this year it is found in twelve yards. The most satisfactory feature of the ship building industry in this country was the signing of contracts by representatives of the Japanese government in Washington, Dec. 31, with the Wm. Cramp & Sons Ship & Engine Building Co., and the Union Iron Works, for two modern and formidable cruisers to cost $1,500,000 each.—[Marine Review.

The Engineers' Society of Western Pennsylvania held its seventeenth annual meeting on Tuesday evening, Jan. 19. Officers for the year 1897 were elected as follows: President, two years, Harry J. Lewis; directors, two years, H. H. McClintic and Jas. M. Camp; secretary, one year, R. A. Fessenden; treasurer, one year, A. E. Frost. The annual banquet of the society will be held at the Duquesne Club, Thursday, February 11.

The Senate, on Monday, passed the bill authorizing the Union Railway Co. to bridge the Monongahela River at Braddock and thus complete the Bessemer system.

BUSINESS IN 1879 AND 1897.

There are certain points in the present commercial and industrial situation which have suggested analogies with 1879. Among these points may be mentioned the fact that in 1896, as in 1878, the balance of foreign trade was enormously heavy in our favor; that the steady outflow of gold has been succeeded by a rather continuous inflow; that the wheat crop has proved deficient in foreign states while reasonably heavy in this country, and that the vote at the fall elections, in 1896 as in 1878, was strongly confirmatory of a sound-money standard for our currency.

These analogies are sufficient to show that the situation does bear some strong points of resemblance. Eighteen hundred and seventy-nine was a memorable year in the financial and commercial history of this country. It is remembered not only as the year of specie resumption, but as a period when prosperity returned in a flood to the United States, after five years of dull and stagnant trade. In the fact that the present year follows another such period of liquidation, the comparison of 1897 is interesting. The year 1897 has, however, opened so disappointingly in nearly all branches of trade that the mere comparison with 1879 has been discouraging to business men. Most people suppose, in a general way, that the nation's commercial prosperity, 18 years ago, began immediately on the first of January, when specie payments were by law resumed. Such people appear to have expected precisely such a return of trade-prosperity immediately after the sound-money vote of last November. Everybody knows how far such expectations have been disappointed as applied to 1897. It is not generally known, however, that the disappointment was equally great during the opening months of 1879.

After the resumption of specie payments in January, 1879, the stock market opened with great buoyancy. The advance lasted about as long, and was about as great, as the advance in stocks based upon the November election last year. Meantime there was no sign of a favorable movement in general trade. During January, 1879, complaints of unprofitable business and trade stagnation were general; London sold American securities to New York; money in New York was a drug because there was absolutely no demand for commercial purposes. At the close of the month, Ellison & Co.'s cotton circular described the condition of the cotton trade in this country and in Europe as so bad that lower wages for cotton operators were predicted as inevitable. During the early part of January the Bank of England's discount rate was high; it ruled at 5 per cent until the middle of the month, as a result of which sterling exchange stood almost at the gold-shipping point from New York. It will be observed that in this particular, also, the record duplicates the experience of 1897. The government revenues were very deficient. In the middle of February warnings appeared in many publications that unless Congress was careful a heavy and disastrous deficit might be looked for.

It is well known that the world's wheat situation, at the opening of 1879, was similar to that of the present year, and that the later prosperity of 1879 was largely based on the enormous foreign demand for American grain. But it is an entire mistake to suppose that this factor in the situation was operative from the year's opening. The wheat product of the world, at that time, was very much below the present average. The Argentine Republic, for instance, was exporting hardly any grain; Australia cut no figure in the world's export market. Nevertheless, the price of wheat, No. 2 red, at the opening of January, was only 108½ cents per bushel in New York, and the January exports of breadstuffs, as recorded by the government authorities, were below the record for the month of 1878. In February and March the shipments of grain were heavy, and the price advanced eight or nine cents a bushel. This was based upon rumors of a deficient French crop and reports of bad weather in England.

But even while these reports were coming in, the movement of the wheat market was exactly similar to the recent movement of this season's wheat market under somewhat similar conditions. After each advance in price, early in 1879, there was sudden speculative selling, and the price once more receded. By April, wheat was almost down to the January level. In June came the famous corner in Chicago wheat, when the New York price went up to $1.20 per bushel, and the news at this time favored such a movement; for on the 5th of July people were wearing winter overcoats in England, and heavy rains were almost destroying the prospect of a harvest. Notwithstanding this fact, the price of wheat declined at New York City, during the month of July, to a figure lower than its price at the opening of January. To this fact the trade reports of that time are sufficient witness. It was not until the last days of September that the wheat market really seemed to take fire; it then advanced something like thirty cents a bushel within three weeks, the exports becoming simply enormous. The truth of the matter was that Europe had deferred as long as it possibly could its orders from America, in the vain hope that it might obtain its grain at easy prices. When the consumers could hold off no longer, the export movement began in quantity, and the rush of rising credit was felt throughout this country.

But it was not until this month of September, 1879, or until very near it, that the true change in the financial situation as appreciated by trade and finance in general. As late in the year as June, sterling exchange advanced to 4.89 to 4.90 for demand, and half a million of gold was shipped to London. At that time the total export trade of the country, since the opening of the year, made a smaller record than it did for the corresponding period in 1878. The situation of foreign exchange had meantime caused great uneasiness at the Treasury. Secretary Sherman wrote to the Treasury's London agent to inquire if it was not possible in some way to arrange for the control of the sterling market by drawing on Europe through the establishment of a London credit; an operation which, if it had been attempted, might have foreshadowed the experience of 1895. The real change in the situation did not come until the middle of July. Up to that time, the same uncertainty was expressed by business men. As late as the opening of March, 1879, the *Financial Chronicle* contained the following editorial remarks: "We have now entered upon our third month since the resumption of specie payments. 'Where is the prosperity promised with that event?' is the question frequently coming to us. 'Wheat is no higher. Corn is no higher. There is no money in any of the earth's products. Where is the promised prosperity?' "

In other words, as late as March, discouragement was general, and as late as June actual alarm was felt over the situation. The stock market did indeed improve from time to time; yet in February, London was a heavy seller of American securities; in March, the stock market broke repeatedly; in April, only professional speculators were active, and they were putting up cheap and worthless stocks.

In the middle of July, however, the heavy outward movement of grain began to be foreshadowed unmistakably. After a trifling gold shipment, the sterling exchange market broke with considerable violence, and at the same time there was great activity in securities at New York. The bank statements of that time showed continued increase of loans and deposits. In the opening week of August, sterling exchange fell to 4.83½ for demand, and gold was engaged for import from the London market. Before the close of August, gold was coming in at the rate of two to three million dollars weekly. But what was of much more importance, the export trade suddenly expanded to enormous proportions. It was by no means confined to wheat and corn. Almost all other products of the farm began to move out in unprecedented quantity. By the middle of the year, the record of exports since the first of January passed that of 1878. In September came the memorable boom in stocks; during the same month came the upward movement in the iron market. The year closed with a general movement of prosperity.

It is worth reviewing this record in order to understand the real analogy between 1897 and 1879. Readers will draw their own inferences from the record. The important fact to notice is, that the famous "year of prosperity," 1879, was a year of doubt, discouragement, and trade stagnation, until nearly six months after resumption of specie payments.—[Evening Post, New York.

THE Robesonia Furnace, at Robesonia, Berks Co., Pa., which has been out of blast nine months, will be started up this week, giving employment to 200 hands.

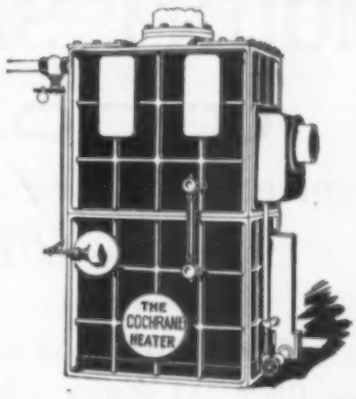
OPEN HEATERS FOR BLAST FURNACES.

"We do not believe in them for plants of this kind," was the remark made to us recently by a prominent engineer whose specialty is the design and construction of blast furnaces.

"Why not?" said we. In reply, he stated that such plants were run continuously night and day, without any stops for examination and repairs, and that therefore closed or pressure Heaters were preferred for this particular service.

Was it not curious that at that precise moment we were shipping two of our large COCHRANE HEATERS to replace some six Heaters of the pressure type, that had given out after a few years' use? These closed heaters had rusted out after continually leaking, and the owners—blast furnace people—thought it advisable to get something better adapted for their purposes.

Hot water—real purification—reliability—ease of operation and cleaning—simplicity and adaptability for the purpose of the material used, insuring freedom from repairs and longevity—these are the advantages which are doubling every year our sales of the COCHRANE HEATERS.



HARRISON SAFETY BOILER WORKS,
PHILADELPHIA, PA.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

A party of Pittsburg capitalists have formed a company for the manufacture of cold-drawn copper-lined steel tubing and will build a plant at Newark, O., where advantages have been given the company. It is said that it has patents on the products it will manufacture. The Pittsburg parties interested are: Geo. H. Everson, J. P. Sharp, E. Hoevelen, W. H. Mitchell and S. B. Bishop, and the Newark directors are F. D. Wright, W. E. Miller, J. H. McCane, J. W. Lee and J. P. Chapman.

Cleveland men have incorporated the American Foundry Co., with a capital of $40,000. The incorporators are Charles A. Irwin, Charles A. Hall, J. J. Carey, Crosby Thompson and John McGurk.

A charter has been granted to the Titusville Forge Co., Titusville, Pa., which has been incorporated with a capital stock of $30,000. The incorporators are J. P. Haule, J. Y. Dillen and J. G. Bentin, all of Titusville.

R. E. Grant, Middleport, O., will buy engines of the following description: One 20 x 30-inch left-hand slide valve; one 60 h. p. Corliss; one 75 h. p. slow speed automatic. Each engine to be complete and in good order. Maker, dimensions, style of each part, price, and other details desired in first letter.

Clarke & Adams, Elberton, Ga., are figuring on second-hand or new outfit for machine shops.

R. S. Stevens, 547 Carondelet street, New Orleans, La., is in the market for two 75 h. p return tubular boilers.

C. L. Featherstone, of Minneapolis, is arranging for stamping machinery, intending to engage in the manufacture of tinware and stamped goods.

George Dalrymple, Fairhaven, Vt., will erect a tube factory 42 x 104 feet, of brick, two stories high with flat roof. Power plant and a plate planer will be purchased.

New Construction:—

A new steel plant is to be erected at Braeburn Station, on the Allegheny Valley Railway, near Pittsburg. William Metcalf, the mechanical and consulting engineer, of Pittsburg, is interested in the project.

The Greensburg, Jeanette & Pittsburg Electric Railway is contemplating the erection of an electric power house at Oxford Park, near Jeanette, Pa.

The Atlanta, Knoxville & Northern Railway Co. has made a proposition for the erection of machine shops at Elizabeth, Ga., at a cost of $15,000, provided it receives inducements from the citizens. R. W. Boone, vice-president of the Board of Trade, Marietta, Ga., has the matter in hand.

Timothy Holland, of Bremen, Ind., is in Baltimore making arrangements for the establishment of a foundry for the manufacture of his patent hot-water radiators, employing 400 operatives. Among Baltimore men interested are Walter B. Brooks, of the Canton Land Co.; Percy McLaren, Arthur Ebberman and D. Eldridge Monroe.

An electric light and power plant will be erected at Sisterville, W. Va. A committee consisting of C. A. King, R. Broadwater, C. F. Hosford, J. C. Morrison and H. A. Wright, will select the site for the plant.

Additions, Enlargements, Removals, Etc.:—

The Curtis Bay Brass & Metal Works, Baltimore, will double the capacity of its present plant and make improvements, including the erection of an additional building of corrugated iron, 40 x 100 feet, and two stories. A new iron foundry is to be built, with a capacity of from 5,000 to 6,000 pounds of light castings a day. This will be 40 x 44 feet.

It is about settled that the Cleveland Ship Building Co., Cleveland, will remove its ship yards to Lorain, O., the contingency being the meeting of their terms as to land and bonus, by the citizens of Lorain. The shipbuilding company needs more room for the building of the big boats that are now the rule on the lakes. There is no intention of removing the engine and boiler works from Cleveland.

The Pittsburg Tin Plate Works, of New Kensington, contemplate an addition which will about double the capacity. The firm now has 10 sets, six for tin plates and four for terne plates, the weekly capacity being 1,650 boxes of tin plates and 600 boxes of terne plates. The tinning plant was built in 1892 and a rolling mill added for the production of black plates in 1894. The latter consists of six heating and two annealing furnaces, and two trains of rolls, one being 24 x 32-inch hot, with three stands and one 24 x 36-inch cold with four stands.

General Industrial Notes:—

The annual election of officers of the Monongahela Connecting Railroad Co. was held last week at the offices of the company, and resulted as follows: President, Henry A. Laughlin; vice-president and treasurer, James Laughlin, Jr.; assistant treasurer, B. F. Jones, Jr.; directors, B. F. Jones, G. M. Laughlin, W. L. Jones, James Laughlin, Jr., W. L. King, B. F. Jones, Jr.

The Youghiogheny Northern Railroad Co. last week elected directors, as follows: H. C. Frick, John Walker, Henry Phipps, Jr.; J. G. A. Leishman, H. W. Borntraeger, George Lauder, H. M. Curry.

Another lot of special Tennessee foundry iron arrived at Pittsburg last week by barge. The iron is a special iron adapted to certain foundry work, and about the same quantity is brought to the Pittsburg market every year.

The machinery for the new packet Queen City, which is being built for the Cincinnati & Pittsburg Packet line, will be furnished by the Pittsburg firm, James Rees & Sons.

The Pittsburg Tool Steel Co. has elected the following board of directors: J. C. Jamison, J. W. Kirker, William Speed and D. P. Thomas, of Pittsburg, and W. G. Henderson, of Sharon, Pa. The board organized by electing J. C. Jamison, president; Wm. Speed, vice-president and general

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UNION MINING CO.,

Proprietors of the CELEBRATED Mount Savage Fire Brick

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Established 1841. Capacity, 60,000 Per Day; 18,000,000 Per Year.

The First Manufactory of its Kind in the U. S.

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CLEVELAND, OHIO.

manager; J. W. Kirker, treasurer, and D. P. Thomas, secretary. It is stated that the Greensburg plant will be enlarged and work commenced at an early date.

The plant of 14 Duff's patent water seal gas producers recently installed in the Otis Steel Works of Cleveland, replacing 38 old form producers, is now completed and is giving satisfaction and doing fully the work formerly accomplished by the larger number of producers.

A London branch office has been opened by the Carnegie Steel Co. Ltd., at 47 Victoria street, Westminster.

The stockholders of the Pittsburg, Shenago & Lake Erie Railway met at Meadville, Pa., last Thursday, and 82,650 shares out of the 96,000 were represented at the meeting, and favored the consolidation of the road with the Butler & Pittsburg Railroad, thus completing the Bessemer Route. On Friday the stockholders of the Butler & Pittsburg Railway met in Pittsburg and also voted in favor of the proposed consolidation.

The Tide Coal Co., of Pittsburg, last week bought the Gray's iron line of steamers from Park, Brother & Co., of the Black Diamond Steel Works. The consideration is said to have been $75,000. The property consists of the steamers Ironsides and Iron Age, 16 model barges and a number of ordinary coal boats and barges. The line was originally built for conveying iron and steel to Southern points, but of late has been utilized in the coal trade.

B. F. Johnston, of Pittsburg, who has been selling for the Manown Mfg. Co., will hereafter handle also the product of the Iron City Fire Brick Co., with works at Sandy Ridge, Pa., and Pittsburg.

The Cataract Construction Co., of Niagara Falls, has contracted with the Westinghouse Electric and Mfg. Co. for five dynamos of 5,000 h. p. capacity and accompanying switchboard and apparatus. Provisional contracts were given the company for two additional dynamos of the capacity as the five already ordered.

The Tennessee Coal, Iron & Railroad Co.'s board has elected Col. C. M. McGhee a director in place of the late John H. Inman, and Col. Oliver H. Payne in place of J. Edward Simmons, resigned.

In the United States Circuit Court, at Pittsburg, last week Judge Atchison issued a temporary injunction restraining the

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1—18x11 ft. New Haven. 1—21x12 ft. Blaisdell.
1—24x14 ft. Hepworth. 1—24x12 ft. New Haven.
1—26x14 ft. New Haven. 1—32x16 ft. Phillips.
1—32x14 ft. Lathe & Morse. 1—36x14 ft. New Haven.

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Johnson Co. from making a certain electric railway device upon which patent rights are claimed by the Thomson-Houston Electric Co.

The Atlantic Furnace, at New Castle, Pa., is being relined.

The Penn Steel Casting Co., Chester, Pa., is replacing the steam shaft crane in its chipping shop with a 20-ton electric crane and will put a similar crane in the machine shop. Preparations are also being made to still further enlarge the plant and install more smelting and drying furnaces.

The Fort Wayne shops of the Pennsylvania Co. have recently built about 200 new box cars. The Northern Pacific is figuring on contracts for new passenger equipment. The Bewrind-White Coal Mining Co. has ordered 150 freight cars from the Middletown Car Works. The Youngstown (O.) Car Works, resumed last week on a large repair order for coke cars.

The ship *Lord Wolseley*, at Pensacola, Fla., Jan. 11, loaded 3,000 tons of pig iron and 800 tons of coke for Yokohama, Japan. This cargo was shipped by the Tennessee Coal, Iron & Railroad Co. through F. O. Howe & Co., Pensacola agents, and is to be followed by others.

The Connellsville Coke Co., of Pittsburg, recently granted a charter of incorporation, has begun work on the construction of its plant in the Connellsville region. Fifty ovens will be built at present, and the number will probably be increased later.

The Birmingham (Ala.) Rolling Mills will shortly resume, employing 1,200 men.

The Shenango Valley Steel Co.'s plant at New Castle, Pa. started up on Jan. 18. The scale for the new year is the same as for 1896, except that four less men are required. Formerly there were six bottom makers, who worked eight hour turns; in the future there will be but four; and they will be on 12-hour turns. One man less will also be required to handle the ladles and one less for the vessels. This is in accordance with the company's original proposition.

Because of its inability to meet an obligation of $83,000, the Common Sense Engine Co. made a voluntary assignment, at Muncie, Ind., Jan. 14. The estimated assets are $200,000; liabilities, $150,000. This is the second time the company has failed. The members are G. Campbell Janney and Dayton R. Janney, brothers.

At Lorain, O., the Johnson Co. is running full in its Bessemer and blooming mills. The shop mill has not been started up as yet.

The Gates Iron Works, of Chicago, has begun to manufacture high speed engines. The Fischer-Gates single and four-valve self-oiling automatic engine will be built under the patents of Mr. Fred F. Fischer. The product will be handled by Fischer & Whiteside, 700-702 Fischer Bldg., Chicago. Plans for additions to the large plant of the Gates Iron Works are completed, and it is intended to push this branch of the business. Orders for these engines are already on the company's books.

The Pennsylvania Bolt & Nut Works, at Lebanon, which had been shut down since before Christmas, resumed last week, with nearly 1,000 hands. The plant will likely run steadily for several weeks. More works in the Lebanon district will be started shortly.

The A. R. Whitney Co., manufacturers of iron and steel, of Morristown, N. J., has been incorporated with a capital of $500,000. The shareholders are J. R. Medway, of Rutherford; D. A. Frisbie and A. R. Whitney, Jr., of New York.

For want of sufficient capital, the Los Angeles (Cal.) Iron & Steel Co. has closed down, and has gone into the hands of a receiver. The company is trying to raise capital to build an open-hearth furnace, which will reduce the cost of material several dollars a ton.

At Springfield O., application has been made for a receiver for the firms of Amos Whiteley & Co., Wilson, Whiteley & Co., and the Whiteley Malleable Iron Co.

A new company will be organized in Winona, Minn., to build the Otto gasoline traction engine, for threshing purposes. The stockholders include S. W. McLaughlin, of the Winona Mfg. Co. and Gustav Langen, of Philadelphia. The company will use the plant of the Winona Mfg. Co. for the

present, but will probably build a large plant and manufacture on a large scale in the near future.

At Sharon, Pa., the Stewart Co. furnace resumed operations last week after a two-weeks' shut-down, occasioned by an explosion.

The H. C. Bowen Foundry Co., Providence, R. I., has bought out the entire plant and assets of the Henry C. Bowen Co., and will continue the manufacture of iron castings and gas stoves, and add the manufacture of brass and other castings. The same management continues.

The mills of the Montpelier (Ind.) Sheet & Tin Plate Co. have been sold for $50,000 to satisfy mortgages held by Neil Bros., Columbus, O. The plant cost, in 1895, $125,000. The purhcaser, the American Tin Plate Co., of Elwood, will start the mill Jan. 25 with 150 hands.

The Newport plant of the Addyston Pipe & Steel Works is now being run full time, on an order for 1,200 tons of sewer pipe for the city of Detroit, Mich. Each pipe is 13 feet long with a diameter of six feet. This will keep the plant going for two months.

The Canton (O.) Rolling Mill Co. has resumed after a long shut-down. The new galvanizing department recently added was also put in operation. Steady operation is insured for some time.

The Robert Aitchison Perforated Metal Co., of Chicago, has just taken a contract for a large lot of perforated metal for use in separators at the mines of the Chateaugay Ore & Iron Co., of Plattsburg, N. Y.

The Atlantic Iron & Steel Co., New Castle, is remodeling one of its blowing engines with a Weimer blowing cylinder and a Weimer-Corliss steam cylinder.

The Carnegie Steel Co., Ltd., has placed orders lately with the Weimer Machine Works Co., of Lebanon, Pa., for 16200-cubit-foot cinder cars of the Weimer patent, for Edgar Thomson furnaces, and 22 of same capacity for Duquesne furnaces. This will make 76 cars the Carnegie has purchased from the Weimer company.

The latter part of the year the Inland Steel Co., of Chicago Heights, Ill., installed special machinery for the manufactuer of cotton ties economically and on a large scale, and is now fully equipped to compete with the largest mills in the country. The location of the company commands all the markets with equal ease, insuring prompt deliveries and low freight rates. The ties will be of full size, length and weight, made of tough steel, and put up in the usual manner.

A new company is to take over the plant and business of the Bucyrus Steam Shovel & Dredge Co., South Milwaukee, Wis. It is named the Buycrus Co. It will continue to make the specialties of the former company, covering all types and sizes of dredging and excavating machinery for every purpose. The new line of steam shovels brought out by this company represents a distinct advance in bringing the design and construction of these machines up to a high standard. A specialty is also made of both light and heavy dredges, in the dipper, elevator or hydraulic types. For the latter type a line of centrifugal dredging pumps are built, having simple, compound or triple expansion engines directly connected, up to 1,000 horse power or more. The company also builds pile drivers, wrecking cars, and placer mining machinery. It proposes to enlarge its crane department, and to manufacture not only locomotive cranes, but also special and power cranes of all descriptions. The officers of the new company are: H. P. Eells, president; A. B. Stetson, superintendent; A. W. Robinson, engineer, and J. M. Millman, secretary and treasurer.

The firm of Schwarzenberg Bros. & Co., Cleveland, dealers in old material, has been dissolved.

The Montpelier Sheet & Tin Plate Co.'s four-mill plant at Montpelier, Ind., will be sold at receiver's sale, under foreclosure. A. J. Lupton is receiver.

The Pittsburg Wire Co.'s mills at Braddock, Pa. manufacturing wire rods, wire nails and special wires, are running to nearly full capacity. The wire nail and galvanizing departments are in full operation, and the rod mill has started.

The Massillon (O.) Light, Heat & Power Co., replying to the claim, amounting to $6,428, set up by Reeves Bros., of Alliance, as a balance due for the construction of a gas holder, assert that the holder was defective; that it had to be rebuilt

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by another concern, the cost of completing the contract being $4,829. The company further claims that it was damaged $2,000 by the delay.

The Chagrin Falls (O.) Mfg. Co. has made a lease for two years of the company's plant to the Ferro-Steel Co., which now has a large plant at Chagrin Falls engaged in manufacturing steel ranges. The newly acquired plant will be run full on sadirons and shelf hardware.

The Edward P. Allis Co., Milwaukee, recently shipped seven carloads of machinery to South Africa. There were three cross compound direct connected engines of 1,000 h. p., and each weighing 160 tons. The engines are for use in the production of electric power to drive pumps and hoists for a large mining company in South Africa. The Allis company is completing a second order for three heavy hoisting engines for South Africa.

On behalf of certain importers and users of crucible steel, the following petition has been presented to the Ways and Means Committee of the House: "We are to a considerable extent users and consumers of high grade crucible cast steel for tool use in our shops. For some purposes we consider it to our advantage to use imported steel, and beg your consideration of the fact that the duty on this class of steel is already at a very high figure, averaging over $40 per ton. In our opinion an increase is unnecessary for the protection of the domestic article, which now sells at very much below the price of imported steel, and we believe that an increase would tend to check importations and thus defeat the object of the proposed new tariff bill, which is, we understand, for the purpose of producing more revenue, rather than the protection of domestic articles already sufficiently protected.

"We beg to call your particular attention to Paragraph 114 of Law of 1894, which by interpretation of the Board of Appraisers includes all high grade sheet steel, 10 gauge and thicker, used for tools and segment saws, although such was not the intention nor spirit of the framers. We would respectfully suggest that the words 'crucible steel and' be inserted after the word 'except,' which would more clearly define the intent of this paragraph. We wish also to call your attention to Paragraph 124 in the same law, and suggest that the words 'sheet steel in strips' be stricken out, as this clause has had the effect of entirely checking importations of many kinds of sheet steel other than the kind intended to be reached by this clause, whereby all or nearly all revenue from this class of steel has been stopped."

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E. S. Mills, Cleveland sales agent for the Carnegie Steel Co., Ltd., and C. A. Otis, Jr., of Otis, Hough & Co., were elected associate members at the January meeting of the Civil Engineers' Club, of Cleveland. The address of the evening was by Mr. S. T. Dodd, on "The Plant of the Niagara Falls Power Co.; Their Method of Generating Power, and the Various Industries in Which It is Utilized."

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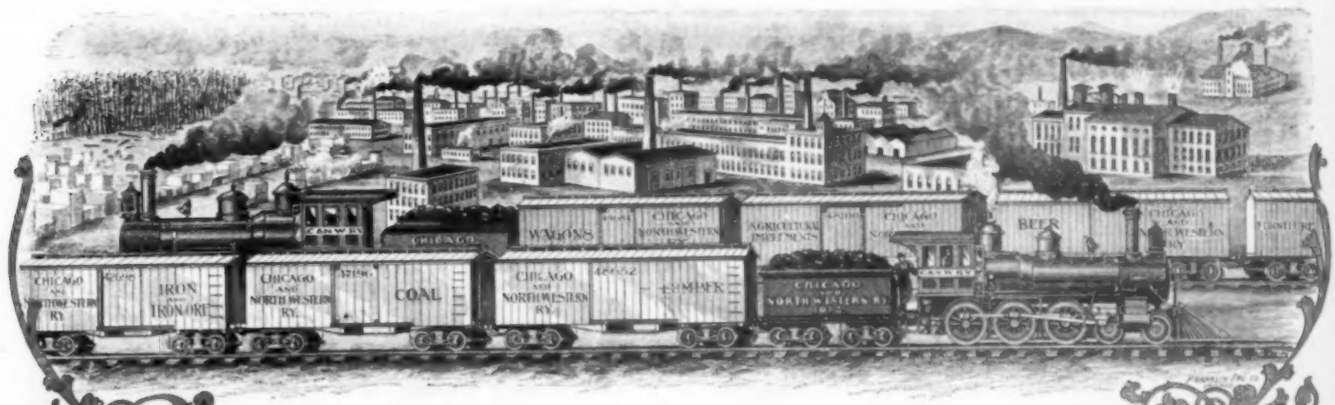

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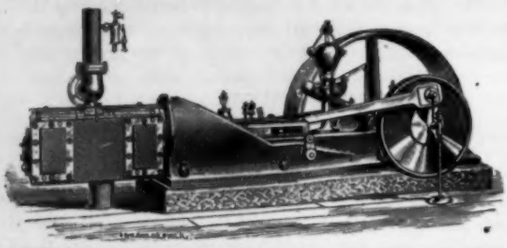

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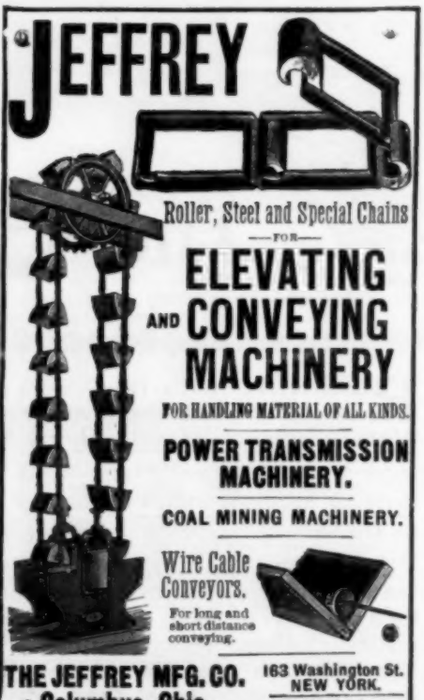

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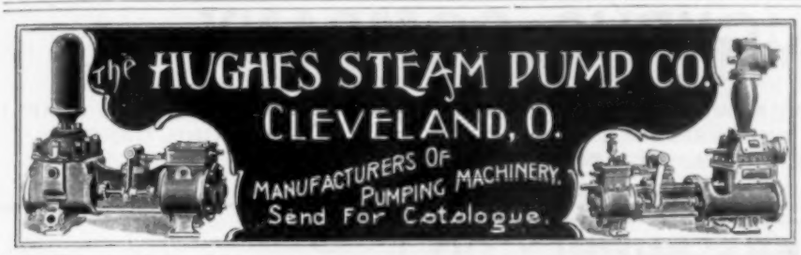

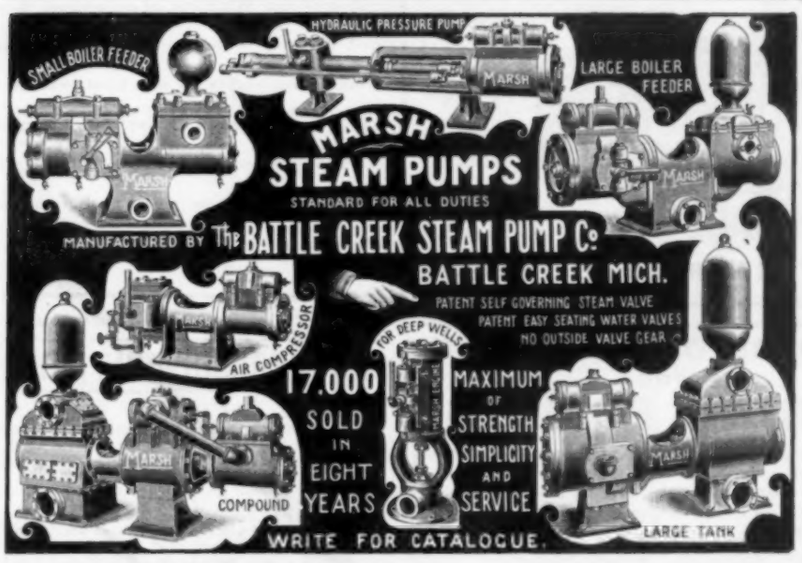

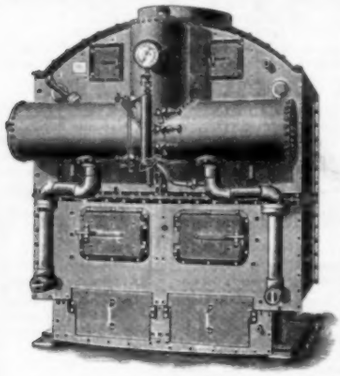

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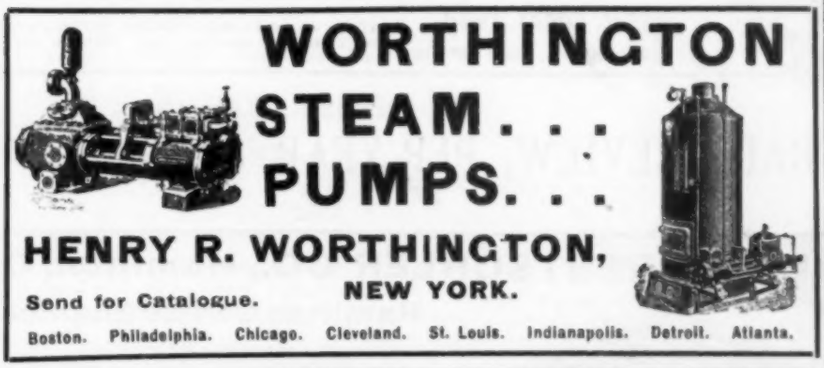

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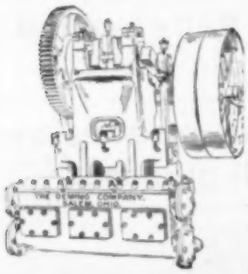

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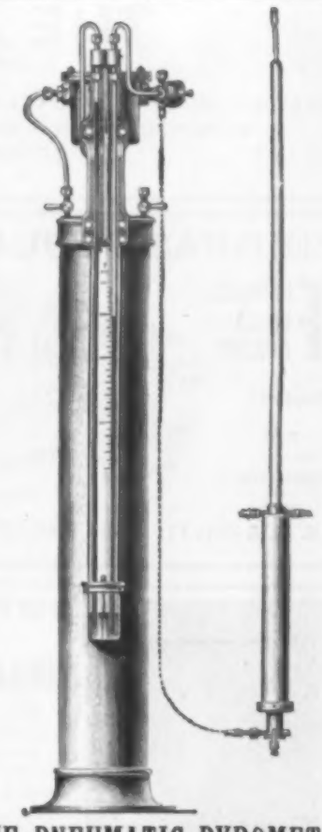

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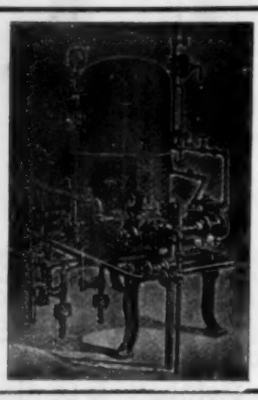

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Pittsburgh and Bellaire	† 7:00 am	†12:10 pm
Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	† 3:15 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 am
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	* 5:00 pm	* 8:30 am
Philadelphia and New York	*11:10 pm	* 4:30 am
Baltimore and Washington	*11:10 pm	* 4:30 am
Alliance and Pittsburgh	*11:10 pm	* 4:30 am

Mt. Vernon and Pan-Handle Route

FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8:10 am	* 5:45 pm
Akron and Columbus	* 8:10 am	* 5:45 pm
Akron and Columbus	† 1:40 pm	†12:10 pm
Columbus and Cincinnati	* 8:00 pm	* 7:30 am

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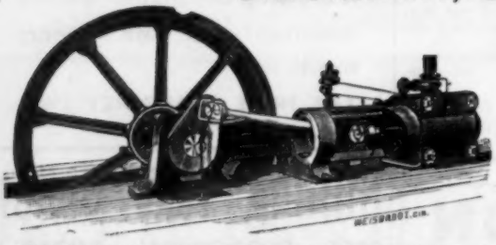

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Akron, Canton & Valley Jct	*10:10 A M	*3:15 P M
Akron, Canton & Chicago	*8:10 A M	*6:30 P M
Akron, Canton & Wooster, Defiance, Garrett, Marietta, Wheeling, Washington, D. C., and Baltimore	†2:55 P M	†11:00 A M

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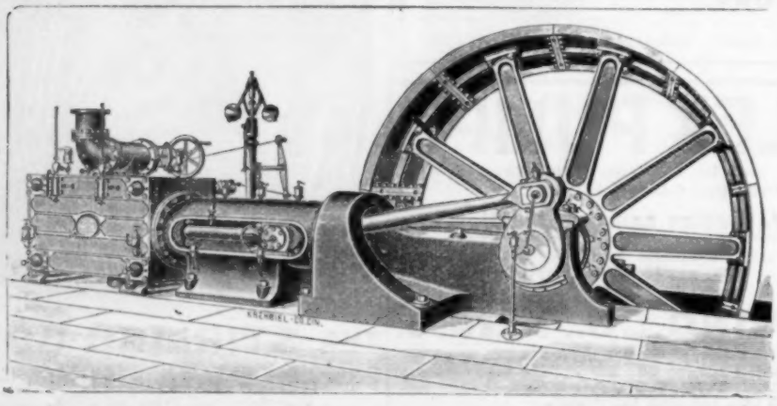

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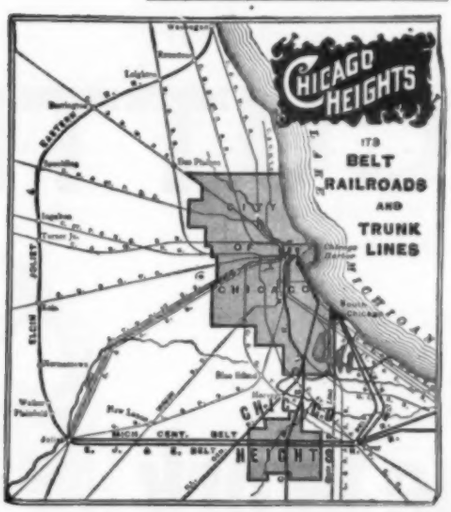

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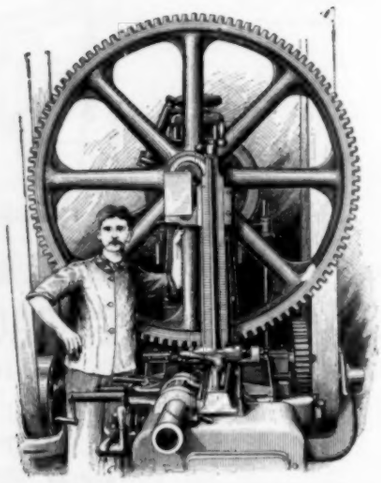

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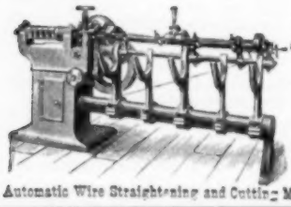

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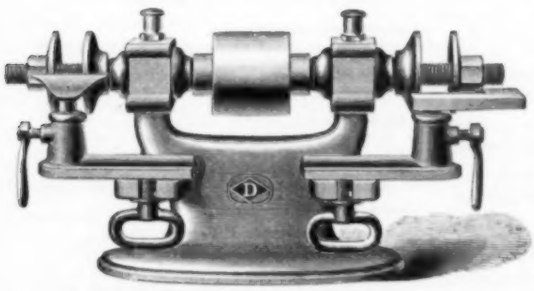

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U. Baird Machinery Co., Pittsburg, Pa.
Bertsch & Co., Cambridge City, Ind.
Lodge & Shipley Machine Tool Co., Cincinnati.
Dietz, Schumacher & Boye, Cincinnati, O.
Superior Machine Co., Cleveland, O.

Machine Screws—
Illinois Screw Co., Chicago, Ill.
C. H. Besly & Co., Chicago, Ill.

Machine Shops—
Toledo Machine & Tool Co., Toledo, O.
Atwood & M'Caffrey, Pittsburg, Pa.
The R. D. Nuttall Co., Allegheny, Pa.
The Lane & Bodley Co., Cincinnati, O.
Superior Machine Co., Cleveland, O.

Magnesia Covering—
C. H. Besly & Co., Chicago, Ill.

Metal Bearings—
North American Metaline Co., Long Island City, N. Y.

Metal Saws—
Q. & C. Co., Chicago, Ill.

Milling Machines—
Lodge & Shipley Machine Tool Co., Cincinnati.

Mining Machinery—
Bucyrus Steam Shovel & &redge Co., South Milwaukee, Wis.
C. H. Besly & Co., Chicago, Ill.
The Edward P. Allis Co., Milwaukee, Wis.
Earle C. Bacon, New York City.
The Lane & Bodley Co., Cincinnati, O.
Gates Iron Works, Chicago, Ill.

Motors—
Westinghouse Electric & Mfg. Co., Pittsburg.
General Electric Co., Schenectady, N. Y.

Molding Sand—
Ohio Sand Co., Conneaut, O.
Newport Sand Bank Co., Newport, Ky.

Oilless Bearings—
North American Metaline Co., Long Island, City, N. Y.

Oil Burners—
W. S. Rockwell & Co., New York City.

Oil Cups—
C. H. Besly & Co., Chicago, Ill.
Diamond Machine Co., Providence, R. I.

Oil Extractors—
Hine & Robertson Co., New York.

Oil Pumps—
C. H. Besly & Co., Chicago, Ill.

Ore Crushers—
The Edward P. Allis Co., Milwaukee, Wis.
Gates Iron Works, Chicago, Ill.

Packing—
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Jenkins Bros., New York City.
Hine & Robertson Co., New York.

Paint—
Iron Clad Paint Co., Cleveland.
Jos. Dixon Crucible Co., Jersey City, N. J.

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Gobeille Pattern Co., Cleveland, O.

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Harrington & King Perforating Co., Chicago, Ill
Aitchison Perforated Metal Co., Chicago.

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Nolte Brass Co., Springfield, O.

Pig Iron—
Pickands, Brown & Co., Chicago, Ill.

Pipe Covering—
C. H. Besly & Co., Chicago, Ill.

Planers—
Lodge & Shipley Machine Tool Co., Cincinnati.
U. Baird Machinery Co., Pittsburg, Pa.

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Enterprise Boiler Co., Youngstown, O.

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Diamond Machine Co., Providence, R. I.

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C. H. Besly & Co., Chicago, Ill.
B. F. Sturtevant Co., Boston, Mass.

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Toledo Machine & Tool Co., Toledo, O.
Bertsch & Co., Cambridge City, Ind.
C. H. Besly & Co., Chicago, Ill.

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W. A. Jones Foundry Co., Chicago, Ill.

Pumps (Steam)—
Battle Creek Steam Pump Co., Battle Creek, Mich.
Deming Co., Salem, O.
The Edward P. Allis Co., Milwaukee, Wis.
Atwood & M'Caffrey, Pittsburg, Pa.
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Hughes Steam Pump Co., Cleveland, O.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.

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The Lloyd-Booth Co., Youngstown, O.

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Robt. Aitchison Perforated Metal Co., Chicago.
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Finished Steel Co., Youngstown, O.
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Ætna-Standard Iron & Steel Co., Bridgeport, O.

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Edwin Harrington Son & Co., Philadelphia.

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Translucent Fabric Co., Quincy, Mass.

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Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

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Steam Packing—
C. H. Besly & Co., Chicago, Ill.

Steam Shovels and Dredges—
Bucyrus Steam Shovel & Dredge Co., Bucyrus, O
Marion Steam Shovel Co., Marion, O.

Steam Separators—
Hine & Robertson Co., New York.

Steam Specialties—
C. H. Besly & Co., Chicago, Ill.

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Playford Stoker Co., Cleveland, O.
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The Lloyd-Booth Co., Youngstown, O.

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Ætna-Standard Iron & Steel Co., Bridgeport, O.

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C. H. Besly & Co., Chicago, Ill.

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S. Fix Sons, Cleveland.

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Cleveland City Forge & Iron Co., Cleveland.

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C. H. Besly & Co., Chicago, Ill.

Valves—
C. H. Besly & Co., Chicago, Ill.
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Buffalo Forge Co., Buffalo, N. Y.
B. F. Sturtevant Co., Boston, Mass.

Wire Machinery—
John Adt & Son, New Haven Conn.

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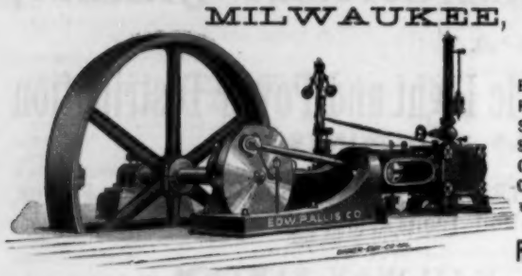
MILWAUKEE, WIS.



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Blowing Engines, Hoisting Engines, Pumping Engines, Air Compressors, Special Engines for Electric Lighting Street Railways and Rolling Mills, Ore Crushers, Crushing Rolls, Stamp Mills, Concentrators, General Mining, Milling and Smelting Machinery.

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IRON ORE.

[On Lake Erie docks.]

No. 1 Specular, Bessemer	$4.50@ 4.75
No. 1 Bessemer hematite	4.00@ 4.25
Hematites No. 1 non-Bessemer	2.25@ 2.50
No 1. Specular, non-Bessemer	2.75@ 3.00

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$10 65@10 90
No. 1 Strong Foundry	11 40@ 11 65
No. 2 Strong Foundry	10 90@ 11 15
No. 1 Gray Forge, red short	... ... 9 65
No. 2 Gray Forge, neutral	... ... 9 90
No. 1 American Scotch	... ... 11 65
No. 2 American Scotch	... ... 11 15
Lake Superior Charcoal	... ... 13 50
PITTSBURG:	
No. 1 Foundry	$11 50@ 11 75
No. 2 Foundry	11 00@ 11 25
Gray Forge	9 65@ 9 75
White and Mottled	... ... 9 50
Warm Blast Charcoal	15 00@ 16 00
Cold Blast Charcoal	... ... 20 00
Bessemer	10 60@ 10 75
CHICAGO:	
Lake Superior Charcoal	$13 50@$14 00
Local Coke Foundry No. 1	11 75@ 12 25
Local Coke Foundry No. 2	11 25@ 11 75
Local Coke Foundry No. 3	11 00@ 11 25
Local Scotch Foundry No. 1	11 75@ 12 25
Local Scotch Foundry No. 2	11 25@ 11 75
Local Scotch Foundry No. 3	11 00@ 11 25
Southern Coke No. 1	11 65@ 11 40
Southern Coke No. 2	10 90@ 11 15
Southern Coke No. 3	10 95@ 11 90
Southern No. 1 Soft	11 40@ 11 65
Southern No. 2 Soft	10 65@ 11 15
Southern Silveries No. 1	12 15@ 12 65
Southern Silveries No. 2	11 65@ 12 15
Jackson Co. Silveries	14 00@ 16 05
Ohio Silveries No. 1	15 00@ 15 55
Ohio Silveries No. 2	14 50@ 15 05
Ohio Strong Softeners	14 00@ 14 28
Alabama Car Wheel	16 65@ 17 15
Malleable Bessemer	12 75@ 13 50
Coke Bessemer	13 00@ 13 50
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$10 75@ 11 00
Southern Coke No. 2 and No. 1 Soft	10 25@ 10 50
Hanging Rock Coke, No 1	12 50@ 13 50
Hanging Rock Charcoal No. 1, Fdy	15 00@ 16 00
Tennessee Charcoal No 1	13 00@ 13 25
Jackson County Silvery No 1	13 50@ 14 00
Southern Coke, Gray Forge	... ... 9 25
" " Mottled	... ... 9 25
Standard Alabama Car Wheel	14 75@ 15 50
Tennessee " "	13 50@ 14 50
Lake Superior " "	14 75@ 15 25
BUFFALO:	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	$12 25@12 50
No. 2 Foundry Strong Coke Iron Lake Superior Ore	11 75@ 12 00
Ohio Strong Softener No. 1	12 35@ 12 60
Jackson Co. Silvery No. 1	14 25@ 15 25
Lake Superior Charcoal	13 50@ 14 50
Southern Soft No. 1	12 25@ 11 40
Hanging Rock Charcoal	... ... 17 00
ST. LOUIS (reported by Rogers, Brown & Meacham):	
Southern Coke No 1	$... ...$11 50
Southern Coke No. 2	... ... 11 00
Southern Coke No. 3	... ... 10 50
Southern Gray Forge	... ... 10 25
Southern Charcoal No. 1	... ... 15 00
Missouri Charcoal No. 1	14 00@ 14 0c
Ohio Softeners	... ... 15 00
Lake Superior Car Wheel	... ... 15 25
Southern Car Wheel	... ... 15 75

OLD RAILS AND SCRAP METAL.

[Delivered Cleveland.]

	Gross Tons
Old iron rails	$14 50
Old steel rails	11 00
Old car wheels	11 00
	Net Tons
No. 1 R. R. wrought scrap	$11 00
Mill scrap	8 00
No. 1 Machine cast scrap	8 50
Iron axles	15 00
Axle turnings	8 00
Wrought turnings (free from cast)	7 50
Cast borings	5 00
Uncut wrought iron boilers	4 00
Steel boiler plates	8 00
Grate bars	5 00
Pipes and flues (clean)	8 00
Tank iron	8 00
Hoop and band iron	6 00
Sheet iron	5 00
Wrought drillings	6 00
Malleable iron	9 00

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. Cleveland)	1.65c
Angles	1.25c
Tees	1.35c
Universal Plates	1.20@1.25c
Sheared Plates	1.30c

MERCHANT IRON AND STEEL.

[Less than car-lots, Cleveland.]

Rounds and Squares.—Bar Iron.

1 to 1⅞	1.20 Base
2 to 3⅝	.30 extra
3 to 3½	.50 "
3½ to 4	.80 "
4½ to 4½	1.00 "
4½ to 5	1.30 "
5½ to 6	1.80 "
6½ to 6½	2.20

PERFORATED METALS
OF ALL KINDS FOR
MILLING, MINING AND AGRICULTURAL MACHINERY.
Perforated Iron, Steel, Copper, Brass, Tin, Zinc, Lead, Etc., to Order.
Large and Varied Assortment of Sizes. Correspondence Solicited.
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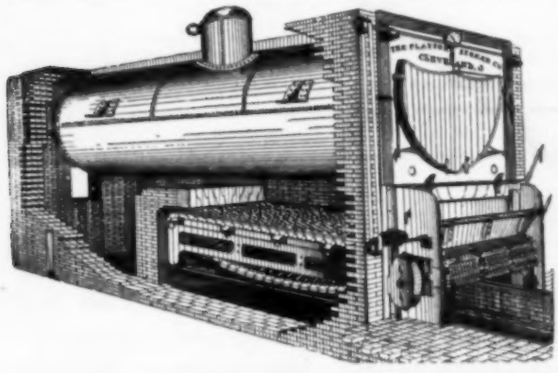
PITTSBURG, PA.
Works and Mines, Westmoreland, Pa.



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Guaranteed to
Abolish smoke, to increase boiler capacity and to save fuel.
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The Playford Stoker Co.,
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MACHINERY FOR HANDLING COAL AND ORE.
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Pays special attention to iron ore, blast furnace, rolling mill, foundry and machine shop interests. Per year **$3.00.**

IRON CLAD PAINT CO.
Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g.
CLEVELAND OHIO.

ORDER DIRECT FROM THE
Iron Clad Paint Co.
And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.
IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.
FURNISHED both Dry and Ground in Oil
USED BY NEARLY ALL THE RAILROADS.

6⅝ to 7¾	2.50 extra.
¾ to ⅞	.10 "
⅝ to 11-16	.20 "
½ to 9-16	.30 "
7-16 to 15-32	.40 "
⅜ to 13-32	.50 "
5-16 to 11-32	.70 "
¼ to 9-32	.90 "
7-32	1.40 "
3-16	2.50 "

Flats.—Bar Iron.

1½ to 4 x ⅜ to 1	1.30 Base.
4⅛ to 6 x ⅜ to 1	.10 extra.
6⅛ to 8 x ⅜ to 1	.60 "
8⅛ to 10 x ⅜ to 1	.80 "
1⅜ to 4 x 1 1-16 to 1½	.30 "
4⅛ to 6 x 1 1-16 to 1½	.40 "
6⅛ to 8 x 1 1-16 to 1½	.60 "
8⅛ to 10 x 1 1-16 to 1½	.90 "
2 to 4 x 1⅜ to 2	.50 "
4⅛ to 6 x 1⅜ to 2	.60 "
6⅛ to 8 x 1⅜ to 2	.80 "
8⅛ to 10 x 1⅜ to 2	1.00 "
2 to 4 x 2⅛ to 3	.60 "
4⅛ to 6 x 2⅛ to 3	.80 "
6⅛ to 8 x 2⅛ to 3	1.00 "
1⅜ to 1⅜ x ⅛ to 1	.10 "
1 to 1 1-16 x ⅛ to ⅜	.80 "
¾ to 15-16 x ⅛ to ⅜	.40 "
⅝ to 11-16 x ⅛ to ⅜	.50 "
½ to 9-16 x ⅛ to ⅜	.90 "

Heavy Band Iron.

7 to 10 x ¼ to 5-16	.70 extra.
6¼ to 6¾ x ¼ to 5-16	.50 "
4⅛ to 6 x ¼ to 5-16	.30 "
1½ to 4 x ¼ to 5-16	.20 "
1 to 1⅜ x ¼ to 5-16	.30 "
⅝ to 15-16 x ¼ to 5-16	.50 "
⅝ to 11-16 x ¼ to 5-16	.80 "
⅜ to 9-16 x ¼ to 5-16	1.00 "
⅜ to 7-16 x ¼ to 5-16	1.50 "

Heavy bands, 7-32 in. thick 1-10 c. per lb. higher than ¼ to 5 16 thick. **Bevel Edge Shaft Iron** 1-10 higher than same size of Heavy Bands.

Light Band Iron.

7 to 8 x No. 9 to 3-16	.90 extra.
7 to 8 x Nos. 10, 11 and 12	1.00 "
6¼ to 6¾ x No. 9 to 3-16	.70 "
6¼ to 6¾ x Nos. 10, 11 and 12	.80 "
4⅛ to 6 x No. 9 to 3-16	.50 "
4⅛ to 6 x Nos. 10, 11 and 12	.60 "
1½ to 4 x No. 9 to 3-16	.40 "
1½ to 4 x Nos. 10, 11 and 12	.50 "
1 to 1 3-16 x No. 9 to 3-16	.50 "
1 to 1 3-16 x Nos. 10, 11 and 12	.60 "
13-16 to ⅞ x No. 9 to 3-16	.60 "
13-16 to ⅞ x Nos. 10, 11 and 12	.70 "
11-16 to ¾ x No. 9 to 3-16	.80 "
11-16 to ¾ x Nos. 10, 11 and 12	.90 "
9-16 to ⅝ x No. 9 to 3-16	1.00 "
9-16 to ⅝ x Nos. 10, 11 and 12	1.10 "
7-16 to ½ x No. 9 to 3-16	1.30 "
7-16 to ½ x Nos. 10, 11 and 12	1.40 "
⅜ x No. 9 to 3-16	1.50 "
⅜ x Nos. 10, 11 and 12	1.60 "

Bevel Edge Box Iron,
Same as Light Bands, of same sizes.
Beaded Band Iron, 1¼ in. to 2 in. .70
Sand Band Iron, 1-10 c. above same sizes of Light Bands.

Oval Iron.

⅜ to 1⅛	.40 extra.
¾ to 13-16	.50 "
⅝ to 11-16	.70 "
½ to 9-16	.90 "
⅜ to 7-16	1.10 "
½ to 9-16 x 3-16	1.00 "
⅝ to 11-16 x ⅛	1.20 "

Half Oval and Half Round,

2¼ to 3	.60 extra.
⅞ to 2	.50 "
¾ to 13-16	.70 "
⅝ to 11-16	.90 "
½ to 9-16	1.20 "
⅜ to 7-16	2.50 "
5-16	3.50 "
¼	4.50 "

Half Ovals less than ¼ their width in thickness, extra price.

Horse Shoe Iron,
All sizes .1 c extra.
Cutting ordinary bars to specified length, 20 to .30 extra, according to length and size.

Steel Bands,

Width In Inches.	English Standard Gauge.	
1 1-2 to 6,	Nos. 7, 8, 9 or 3-16"	1.50 Base.
		Extras.
1⅛ to 6,	" 10, 11, 12 or ½"	.05 per 100 lbs.
1 to 1¾,	" 7, 8, 9 or 3-16"	.10 "
1 to 1¾,	" 10, 11, 12 or ½"	.15 "
13-16 and ⅞,	" 7, 8, 9 or 3-16"	.20 "
13-16 and ⅞,	" 10, 11, 12 or ½"	.25 "
11-16 and ¾,	" 7, 8, 9 or 3-16"	.30 "
11-16 and ¾,	" 10 11, 12 or ½"	.35 "
9-16 and ⅝,	" 7, 8, 9 or 3-16"	.40 "
9-16 and ⅝,	" 10 11, 12 or ½"	.45 "
½,	Nos. 7, 8, 9 or 3-16"	.55 "
½,	" 10, 11, 12 or ½"	.60 "
7-16	" 7, 8, 9 or 3-16"	.75 "
7-16	" 10, 11, 12 or ½"	.85 "
⅜,	" 7, 8, 9 or 3-16"	.95 "
⅜,	" 10, 11, 12 or ½"	1.05 "

Iron and Steel Hoops.

Width in Inches.	English Standard Gauge.	
1 7-16 to 3	Nos. 13, 14, 15 and 16	1.60 Base
		Extras
1 7-16 to 2,	" 17, 18, and 19	.05 per 100 lbs.
1 7-16 to 2,	" 20	.10 "
1 7-16 to 2,	" 21	.15 "
1 7-16 to 1¾,	" 22	.25 "
1 ⅛ to 1¾,	" 13, 14 and 15	.05 "
1⅛ to 1¾	" 16,17 and 18	.10 "

Soft Steel Bars, Light

LOW PRICES

do not always influence business. Some brands of goods are undesirable as a **Gift.**

Write us for our catalogue and send us a sample order and see if there is not **Economy** in using **First Quality** goods at Fair Prices.

Structural Shapes, Rails.

TIN PLATES,
GALVANIZED SHEETS,
CORRUGATED IRON,
BLACK PLATES,

Sheet Iron and Steel, any finish, patent leveled or common.

Aetna Standard Iron & Steel Co.,
BRIDGEPORT, OHIO.

W. H. COFFMAN COKE CO.

BLUEFIELD, W. VA.

GENERAL FACTORS AND SH'PPERS OF

POCAHONTAS FLAT-TOP COKE.

So low in ash that it requires no fluxing for foundry purposes. Our foundry and furnace coke was awarded the first premium at the World's Fair in 1893.

AVERAGE ANALYSIS OF COKE.

Moisture	00.196	Sulphur	00 677
Fixed Carbon	93.625	Ash	05.004
Volatile Matter	00 494		

Foundry, Furnace and all sizes of crushed coke. Guaranteed lower in Sulphur than any other commercial coke

Persistence in Advertising

Is one of the requisites of satisfactory results. In the expansion of business which is confidently expected in the United States in the very near future, advertisers who have made themselves regularly prominent in the past two years will be first to reap the rewards of persistent publicity.

WORLD'S FAIR AWARD.

We are the only Steel Roofing Co. awarded Medal and Diploma for PATENT CAP ROOFING at World's Columbian Exposition. We are also large manufacturers of all styles of METAL ROOFING, SIDING, CEILING, ETC. Send for Catalogue and Price List. Mention this paper.

SYKES IRON & STEEL ROOFING CO., • Chicago and Niles, O.

DO YOUR

SKYLIGHTS LEAK?

Then send for our catalogue. It will tell you how to repair them so they will never leak.

Translucent Fabric Skylights are now in use in all parts of the United States, and are giving the best satisfaction. Why? Because they never crack, break or leak, cost nothing for repair work and are inexpensive to build.

TRANSLUCENT FABRIC CO., QUINCY, MASS.

1⅛ to 1⅜,	"	19 and 20	.15 per 100 lbs.
1⅛ to 1⅜,	"	21	.20 "
1⅛ to 1⅜,	"	22	.30 "
15-16 and 1,	"	13, 14 and 15	.10 "
15-16 and 1,	"	16, 17 and 18	.15 "
15-16 and 1,	"	19 and 20	.20 "
15-16 and 1,	"	21	.25 "
15-16 and 1,	"	22	.35 "
⅞,	Nos.	13, 14 and 15	.20 "
⅞,	"	16, 17 and 18	.25 "
⅞,	"	19 and 20	.30 "
⅞,	"	21	.35 "
⅞,	"	22	.45 "
¾ and 13-16	Nos.	13, 14 and 15	.30 "
¾ and 13-16	"	16, 17 and 18	.35 "
¾ and 13-16	"	19 and 20	.40 "
¾ and 13-16	"	21	.45 "
¾ and 13-16	"	22	.50 "
¾ and 13-16	"	23	.60 "
11-16,	Nos.	13, 14 and 15	.35 "
11-16,	"	16, 17 and 18	.40 "
11-16,	"	19 and 20	.50 "
11-16,	"	21	.60 "
11-16,	"	22	.70 "
11-16,	"	23	.80 "
⅝,	Nos.	13, 14 and 15	.40 "
⅝,	"	16, 17 and 18	.45 "
⅝,	"	19 and 20	.55 "
⅝,	"	21	.65 "
⅝,	"	22	.75 "
⅝,	"	23	.85 "
9-16,	"	13, 14 and 15	.45 "
9-16,	"	16, 17 and 18	.50 "
9-16,	"	19 and 20	.60 "
9-16,	"	21	.70 "
9-16,	"	22	.80 "
9-16,	"	23	.90 "
½,	"	13, 14 and 15	.55 "
½,	"	16, 17 and 18	.60 "
½,	"	19 and 20	.70 "
½,	"	21	.80 "
½,	"	22	.90 "
½,	"	23	1.00 "
7-16,	"	13, 14 and 15	.80 "
7-16,	"	16, 17 and 18	.90 "
7-16,	"	19 and 20	1.00 "
⅜,	"	13, 14 and 15	1.00 "
⅜,	"	16, 17 and 18	1.10 "
⅜,	"	19 and 20	1.20 "

Sheet Iron.

No. 10	1 50
No. 12	1 70
No. 14	1 60
No. 15-17	1 75
No. 18	1 85
No. 20	2 00
No. 22-24	2 10
No. 25-26	2 20
No. 27	2 30

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 35
Shell	1 45
Flange	1 55
Marine Flange	1 60
Fire Box	2 05

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special.

American Cast Tool Steel.

ROUND, SQUARE, AND OCTAGON.	cts lbs.
1 to 2 in. inclusive	08
9-16 to ⅞ in. "	08
7-16 to ⅞ and 2⅛ to 3 in	09
3⅛ to 4 in	09½
⅞ to 11-16 and 4⅛	10
⅛ to 6 in	10½
¼ to 9-32 and 6⅛ to 7 in	11
1 in	13

Flats.	cts. lbs.
2 to 9-16 in. wide by 2 to ⅜ thick	08

Bessemer and O. H. Steel.

Bessemer Machinery	base price,	1 40
Open-hearth Tire	"	1 45
Open-hearth Spring	"	1 80
Sleigh Shoe	"	1 45
Toe Calk	"	1 90
Cutter Shoes, tapered and bent	"	1 60

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	13½c
" "Choice"	35c

Burden Boiler Rivets.

⅛, ⅜, 11-16 and ¾ inches diameter	3 00
Bridge ⅜, ⅝, 11-16 and ¾ inch diam	2 55

Wrought Pipe and Boiler Tubes.

Lap weld black,	base,	four 10s	62
Butt "	"	four 10s	62½
Lap "	galv. "	four 10s	52½
Butt "	" "	four 10s	50
Boiler tubes 2¼" and smaller			70
Boiler tubes 2⅜" and larger			75
Casting screw and socket joint			dis. 52½
Casing inserted joint			dis. 47½

SHIFFLER BRIDGE COMPANY,

BUILDING DEPARTMENT.

SPECIALTIES: STEEL AND IRON BUILDINGS FOR ROLLING MILLS TIN PLATE PLANTS, STEEL WORKS, FOUNDRIES, FACTORIES, ROOF TRUSSES, GIRDERS, COLUMNS, BEAMS, CORRUGATED IRON, ETC.

Main Office and Works:
48th Street and A. V. Ry.
PITTSBURG, PA.

Branch Offices:
1123 Betz Building, Philadelphia, Pa.
65 Dexter Building, Chicago, Ill.
228 Lumber Exchange, Minneapolis, Minn.

The Iron Trade Review

Pays special attention to iron ore, blast furnace, rolling mill, foundry and machine shop interests. Per year **$3.00.**

CAMBRIA STEEL.

Steel Rails, Blooms, Billets, Beams, Bars, Axles, Angles, Channels, Castings, Forgings, Zee Bars, Car-Channels, Locomotive, Car and Structural Steels, etc.

CAMBRIA IRON COMPANY, S. W. Cor. 15th and Market Sts., opp. Penna. R. R. Station, Philadelphia; Chicago office, Western Union Building; New York office, (for Rails and Axles), 33 Wall St.; Cleveland office, Bourne, Fuller & Co; Detroit office, Newberry Bldg.; Toledo office, The Nasby, No. 401; Cincinnati office, cor. Elm and Pearl Sts. Works at Johnstown, Pa.

GAUTIER STEEL DEPARTMENT OF CAMBRIA IRON CO.,

JOHNSTOWN, PA.

MERCHANT BAR STEEL: Including Tire, Toe Calk, Machinery, Carriage Spring, Railroad Spring, Hoe, Rake, Fork, etc.
AGRICULTURAL STEEL AND SHAPES: Finger Bars, Knife Backs, Rake Teeth, Bundle Carrier Teeth, Tedder Forks and Springs, Spring Harrow Teeth, Harrow (Drag) Teeth, Seat Springs, etc.
PLOW STEEL: Flat and Finished Plow Shapes, Digger Blades, Slabs (Penn and Pernot), Hammered Lay, Rolled Lay, etc.

Cold Rolled Steel Shafting. **Steel Harrow Discs.** **Cambria Link Barb Wire.**

New York Office, 102 Chambers St. | Philadelphia Office, 611 Phila. Bourse. | Chicago Office, 209 Western Union Bldg. | Atlanta Office, 325 Decatur st.

STUART FIRE BRICK CO.

MANUFACTURERS OF
Silica Brick
For Open-Hearth, Basic and Acid Steel Furnaces, Glass and Copper Tank Furnaces. Extra Shapes MADE TO ORDER.
Office, Room 21, Conestoga Bldg., Cor. Wood and Water Sts., PITTSBURG, PA.

MACHINERY SUPPLY MARKET.

[From Store, Cleveland.]

Anvils.

American ..... ₩ lb 9@10
Wright's ..... ₩ lb 12

Bellows.

Blacksmiths' { Hill's ..... dis 40
{ Bullock's ..... dis 50&10
Moulders' ..... dis 40@40&10
Hand ..... dis 40&10@50

Belting.

Boston Belting Co.'s standard ..... dis 70 & 10
" " " extra ..... dis 60&10
" " " best ..... dis 55
Cleveland Rubber Co. extra standard ..... dis 60&10
Hoyt's Short Lap ..... dis 50
Shultz Raw Hide Leather Belting, single ..... dis 40
Munson's Short Lap Single Leather ..... dis 50
Munson's Short Lap Double and Light Double Leather ..... dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double ..... dis 40
Standard, oak tanned ..... dis 50&10
Alexander Brothers' pure oak tanned ..... dis

Blowers and Exhausters.

B. F. Sturtevant's ..... dis 20
Boston Blower Co. ..... dis 35

Chucks.

Cushman's 4 Jaw Independent ..... dis 45
" Combination ..... dis 40
" Geared Scroll ..... dis 50
" 2 Jaw Brass Workers ..... dis 30
" Drill ..... dis 35
Wescott's Scroll Combination ..... dis 33⅓
" Independent ..... dis 40
" Little Giant Drill ..... dis 33⅓
Horton's Independent ..... dis 45
Whiton's Independent ..... dis 45
National Combination ..... dis 45
Sweetland " ..... dis 40
Almond Drill ..... dis 40
Morse " ..... dis 20
Skinner's Combination Lathe ..... dis 40&15
" Independent Lathe ..... dis 40&10
" Universal Lathe ..... dis 40&10
" Drill ..... dis 30

Cutters and Reamers.

Cleveland ..... dis 10@15
Pratt & Whitney ..... dis 10@15
Standard ..... dis 10@15
Morse ..... dis 10 to 15
Brown & Sharpe, Milling Cutters ..... dis 15
" " Gear Cutters ..... dis 15

Crowbars.

Cast Steel ..... ₩ 3½
Iron, steel points ..... ₩ lb 3

Drill and Drill Sockets.

Twist Drills
Morse Taper & Straight Shank to 1½" ..... dis 50 & 10 to 60
Morse Taper and Straight Shank Larger than 1½" ..... dis 25
Drill Sockets ..... dis 25
Standard Twist Drills ..... dis 60@60&5
Cleveland " " ..... dis 60&60&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150 gr.	Flour F. F.
Kegs, ₩ lb	4½c	5 c	5½c
½ kegs ₩ lb	4¾c	5¼c	5¾c
¼ kegs ₩ lb	5 c	5½c	6 c
10 lb cans, 10 in case	6 c	6½c	7 c
10 lb cans less than 10	10 c	10 c	7½c

Emery Cloth and Paper.

Barder, Adamson & Co. ..... dis 50@50&5
H. H. Barton ..... dis 50@50&5

Emery Wheels.

Detroit ..... dis 60@70
Norton's ..... dis 60@70
Grant ..... dis 60@70
Sterling ..... dis 60@70
Celluloid ..... dis 10@33⅓
Northampton ..... dis 50
Crystal ..... dis 65@70
Vitrified ..... dis 60@70
Vulcanite ..... dis 60&10
Hamden ..... dis 60&10@70
Cyclone ..... dis 60@60&10

Files.

Arcade ..... dis 60&10@60&10&10
Nicholson ..... dis 60&10@60&10&10
" X. F. ..... dis 25
Kearney & Foot ..... dis 60&10@60&10&10
Black Diamond ..... dis 60&10@60&10&10
McClellan ..... dis 60&10@60&10&10
Disston's ..... dis 60@70
Western ..... dis 70
Stub's ..... dis 25
Grobet's ..... dis 30
Reynolds Bros.' Hand Cut ..... dis 50
Industry File Works Hand Cut ..... dis 50

Hammers.

P. S. W ..... dis 40
Atha new list, Jan. 15, 1897 ..... dis 50
Heavy hammers and sledges under 5 lbs 10c
" " " " over 5 lbs 8c

Jack Screws.

Illinois Bolt Co. list ..... dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5⅝	4½	4	3½	3¼
Hexagon	15⅝	11⅜	8⅝	6	5⅜	5⅛	
Washers	9	8	7	5	4⅝	4⅜	4⅛

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

Standard Penny Nails, ₩ keg, base.
{ Car lots ..... $1.
{ Less than car lots ... $1.60

Perforated Filter Press Plates.

THE HARRINGTON & KING PERFORATING CO. CHICAGO.

BRONZE SCREEN PLATES To withstand action of ACIDULATED WATERS.

PERFORATORS OF STEEL, IRON, COPPER, ZINC, BRASS AND TIN.

For use in GRAIN CLEANING AND MINING MACHINERY, WOOLEN, COTTON, PAPER AND PULP MILLS, RICE, FLOUR AND COTTON SEED OIL MILLS, SUGAR AND MALT HOUSES. DISTILLERIES, FILTER PRESSES. STONE, COAL, AND ORE SCREENS, BRICK AND TILE WORKS, FILTERS, SPARK ARRESTERS, GAS AND WATER WORKS, OIL, GAS AND VAPOR STOVES, COFFEE MACHINERY, ETC.

STANDARD SIZES PERFORATED TIN AND BRASS ALWAYS IN STOCK.

Main Office and Works, 226 North Union Street, Chicago, Ill., U. S. A. Eastern Office, No. 284 Pearl St., New York.

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 50
Medart Pulleys.....dis 50
Split Wood Pulleys.....dis 55@60

Pulley Blocks.

Moore's Anti-Friction Differential Chain Pulley Block.....dis 20

Rivets.

Iron, Thousand, list November 1, 1894.....dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894.....dis 60@65
Copper.....dis 50@50&10

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list.....dis 10
Machine Screw Taps.....dis 50
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 55
Pulley Taps.....dis 40

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 30

Wire.

New List, Apr. 9, 1894

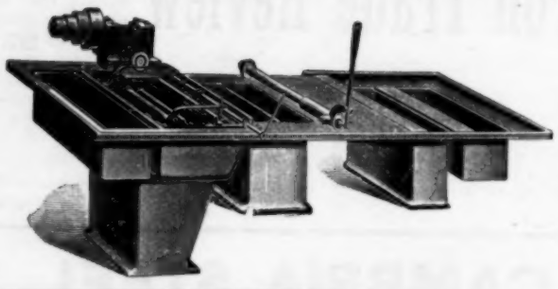
Brass.....dis 35
Copper.....dis 35
Bright and annealed, Nos. 0@18.....dis 70&10@7½
" " Nos. 19@26.....dis 75@75& 5
" " Nos. 27@36.....dis 75&10& 5
Coppered Nos. 0 to 18, market list.....dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis65& 5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....95c ₩ lb dis 30

Wrenches.

Coe's genuine.....dis 4 and 10
Girard Standard.....dis 70&15
Agricultural.....dis 75&15
Mechanic's.....dis 55&10& 0
Bemis & Call's Combination.....dis 30
Donohue's Engineers.....dis 20&15
Lamson & Sessions Engineers.....dis 65
Billings & Spencer's Drop Forged.....dis 25
William's " " .....dis 25
Alligator " " .....dis 40

THE LLOYD-BOOTH CO., YOUNGSTOWN, OHIO.

Tinning MACHINERY.



Rolling Mills, Sand and Chill ROLLS.

STERLING EMERY WHEEL MFG. CO. TIFFIN, O.

CORRESPONDENCE SOLICITED

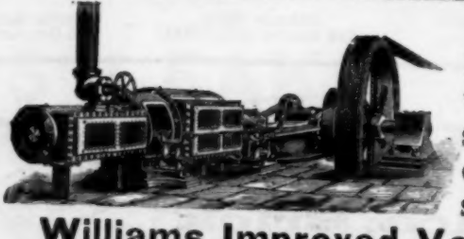
AGENTS:

Chicago Branch, 59 So. Canal St.
The Geo. Worthington Co., Cleveland.
Somers, Fitler & Clarke. Pittsburg

WILLIAM TOD & CO.

YOUNGSTOWN, OHIO.

The Porter-Hamilton Engine



Reversing Engines, Blowing Engines, Converters, Hydraulic and special heavy machinery for the iron and steel trades.

Williams Improved Vertical Engines

For Direct Electrical and all High Class Work.

39-41 Cortland St., N. Y.
E. F. WILLIAMS.

Park Building, Pittsburg,
SEWARD S. BABBITT.

Persistence In Advertising

Is one of the requisites of satisfactory results. In the expansion of business which is confidently expected in the United States in the very near future advertisers who have made themselves regularly prominent in the past two years will be first to reap the rewards of persistent publicity.

THE CELEBRATED

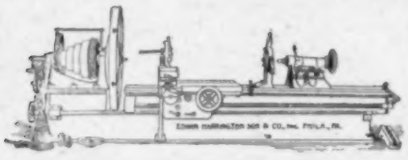
HARRINGTON HOIST

Is Made only in Philadelphia.

EDWIN HARRINGTON, SON & CO., INC.,

1526 Penna. Avenue,

MANUFACTURERS OF **Iron-Working Tools.**



"THE IRON TRADE REVIEW"

is an increasingly valuable medium through which to sell equipment to machine shops and foundries.

CLEVELAND ELECTROTYPE CO.

ELECTROTYPING ENGRAVING AND STEREOTYPING.

50 HIGH ST. — TEL. 2139.

J. M. ALLEN, President.

WM. B. FRANKLIN, Vice-President.

F. B. ALLEN, Second Vice-President.

J. B. PIERCE, Secretary and Treas.

HARTFORD STEAM BOILER INSPECTION AND INSURANCE CO.

HARTFORD, CONN.

BURWELL & BRIGGS, General Agents, 32 Wilshire Bldg., Cleveland, O.

C. A. BURWELL, Chief Inspector, 32 Wilshire Bldg., Cleveland, O.

J. E. WOLCOTT, Special Agent, 96 4th Avenue, Pittsburgh, Pa.

PYROMETERS

Edward Brown,

ESTABLISHED 1860.

311 WALNUT St., PHILADELPHIA.

Manufacturer and Patentee

OF THE

Hot Blast (or Graphite) Pyrometer.—The only stationary Pyrometer now in use durable over 700 degrees.

The Standard Portable Pyrometer—For Blast Furnaces.

Mercury Revolution Indicator.—Centennial Exhibition Medal. Accurate for all time.

Annealing Oven Pyrometer—to 3,000 degrees—of 1891.

Tin-plating Pyrometer—of 1894.

Mercury and Steam Gauges.

THE BETHLEHEM IRON CO.,

Principal Office and Works,

SOUTH BETHLEHEM, PA.

STEEL RAILS.

BILLETS AND MUCK BAR,

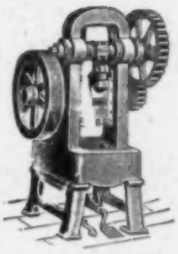
STEEL FORGINGS.

HOLLOW SHAFTING, CRANKS, ROLLS, GUNS AND ARMOR.

Rough, Machined or Finished, Fluid Compressed, Hydraulic Forged.

NEW YORK OFFICE, 100 BROADWAY. PHILADELPHIA OFFICE, 421 CHESTNUT ST.

CHICAGO OFFICE, MARQUETTE BUILDING.



No. 54 Power Press

TOLEDO MACHINE & TOOL CO.,

501-505 Superior St., Toledo Ohio.

We manufacture

Power Punches — Forging Presses.
Power Presses. — Trimming Presses.
Straight Sided Double Pitman Presses.
Drop Presses.
Embossing Presses. — Automatic Feed Presses.
Stamping Presses. — Power Slitting Machines.
Riveting Machines. — Power Shears.

Special and Automatic Machinery Dies for all classes of work in sheet metals.

Write for catalogue and prices.

No. 75 Power Press.

THE "CLEARFIELD" FIRE BRICK

MANUFACTURED BY

THE CLEARFIELD FIRE BRICK CO., Limited,

Office and Works at CLEARFIELD, PA.

929 Liberty Street, Pittsburg, Pa., John Richardson, Agent.

THE 1896 EDITION

OF THE

Iron and Steel Directory

Will be sent postpaid by *The Iron Trade Review* at **$6.**

Is a thorough revision of the list of blast furnaces, rolling mills, Bessemer and Open-Hearth steel works, plate and sheet mills, nail mills, tin plate mills, malleable, cast iron pipe and wrought pipe works, car wheel and locomotive works.

CLEVELAND ROLLING MILL CO.,

CLEVELAND, - OHIO,

—MANUFACTURERS OF—

BESSEMER AND OPEN-HEARTH STEEL,

Blooms, Billets, and Slabs, Steel Rails, Steel Beams, Channels and Angles. Steel Forgings, Bar Spring, and Sleigh Shoe Steel. Steel Wire of all kinds. Barbed Wire, Iron and Steel Plates, Galvanized and Black Sheet Iron and Steel Corrugated Iron Roofing.

KING'S SIX TON ELECTRIC CRANE

Can be furnished at low cost.

Write for full information to the MARION STEAM SHOVEL CO Marion, Ohio.

FIRE BRICK

DOVER FIRE BRICK CO.,

MANUFACTURERS OF

Furnace, Mill and Special Shape Fire Brick.

Office, 44 Mercantile Bank Bldg., CLEVELAND, OHIO.

THE

ELLMAN,

SEAVER

NGINEERING CO.,

w England Bldg.,

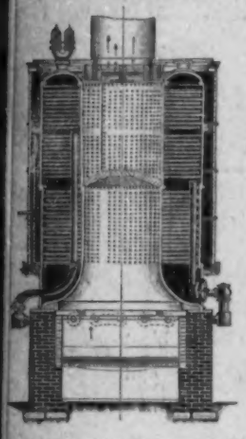
LEVELAND, O.

ENGINEERS

AND

CONTRACTORS.

e make a specialty of the de- and construction of STEEL RKS, ROLLING MILLS STEEL WORKING MA- INERY. Metallurgical naces of all kinds. Steel dings for all purposes. Spe- Electric and other power velling Cranes and Gantries.



e have undertaken to exploit Berry Safety Boiler.

WHY?

ecause after watching it in the deat kind of service for two rs, we are fully convinced that embodies in its construction e good points than any other ler ever built.

t will be manufactured at the rks of John Mohr & Sons, icago, which fact alone is a arantee that both material and rkmanship will be the best t money can buy.

ome of the good points of the rry Boiler are the following:

It gives uniformly DRY STEAM.

It is SAFE and durable.

Is economical in first cost.

Is economical in maintenance.

gives the greatest horse-power per square foot of floor space occupied.

Send for our descriptive pamphlet, which will tell you the hole story.

THE HART OR DETROIT

Emery Corundum Wheels and Machinery.

Write to J. WENDELL COLE, M. E.,

District Manager, No. 911 Chicago Opera House Block, Chicago, Ill., or Box 84, Columbus, O

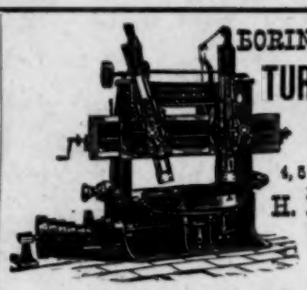
N. B.—Also Agent for WM. SELLERS & CO.'S SPECIAL TOOL GRINDER and TWIST DRILL GRINDER WITH POINTER, for Pennsylvania, Ohio, Indiana, Illinois and Wisconsin.

AUTOMATIC GEAR CUTTERS

GEAR CUTTING OF ALL KINDS.

SUPERIOR MACHINE CO., CLEVELAND, O.

When you write to firms advertised in our columns, please mention the fact that you took their address from our paper. They will thank you for it.



BORING AND TURNING MILLS,

4, 5 & 6 Ft. Swing.

H. Bickford,

Lakeport, N. H.

Send for Photograph and Low Price.

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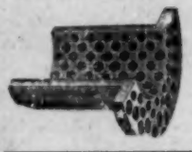

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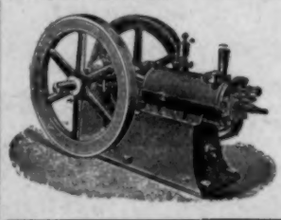

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